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OF THE

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AND

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FOURTH SERIES.

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JOURNAL

OF THE

BATH AND WEST OF ENGLAND AND SOUTHERN COUNTIES SOCIETY.

Proceedings of the Society.

I.—*Report of Council received at the Annual Meeting of the Society, held on June 6th,* 1890.

THE Council, in submitting their Annual Report, are again enabled to congratulate the Members upon the success which has attended the Society's general operations, as well as upon its financial prosperity.

During the past year deaths and resignations have deprived it of 71 Members, but its ranks have been recruited by the addition of 123 new ones. The total number of Members at present on the Society's books is 1263, as against 1205 last year.

Since the last Annual Meeting the Society has lost by death an old supporter and Vice-President in Viscount Falmouth, and one of its senior members of Council in the Hon. and Rev. J. T. Boscawen, F.L.S. A special tribute is due to the memory of the last-named, whose devotion to the Society and the ability and enthusiasm he brought to bear, as Steward of Horticulture, will long be held in grateful remembrance.

The Council have also to deplore the loss, within the last few days, of the Editor of the 'Journal,' Mr. Josiah Goodwin, who passed away on Tuesday last after a long and honourable connection with the Society. Mr. Goodwin was appointed to the post of Editor in 1859, and from 1866 to 1882 he was Secretary also. In the 'Journal' itself is to be found the best evidence of the ability, conscientiousness and sound judgment he brought to bear upon his work, whilst the success with which he accomplished it, in the face of prolonged and acute suffering, eloquently testified to his courage and perseverance.

An extraordinary vacancy in the Council among the Members elected without reference to district caused by the election of

Mr. N. Story-Maskelyne, M.P., as a Vice-President, has been filled up by the election of Capt. J. W. Casberd-Boteler, and Mr. J. D. Pratt has been elected in the place of Mr. Boscawen in the Western Division.

The Council have transferred a portion of the Society's invested capital of the nominal value of 3500*l.* from Government Stock to Canadian, Queensland and New South Wales Inscribed Stock. They have also invested a further sum of 500*l.* in Canadian Inscribed Stock, making the total of the Society's invested capital 16,500*l.*

The promotion of Education in Dairying has been a prominent feature of the Society's operations during the past year, and Schools for instruction in butter-making have been successfully carried on at Clevedon, Coventry, Berkeley, Hampstead, Bridport, and Pembroke. The Council gratefully acknowledge the gracious kindness of H.R.H. the Princess Louise, who presented the prizes gained by the Hampstead students. Remarkable success has attended the introduction of the School into Wales, 45 students having enrolled themselves at Pembroke, and nearly 2000 persons having paid for admission to witness the operations.

A gratifying testimony to the utility of these Schools has been borne by the Government Board of Agriculture in its recent Report to Parliament and by its award of monetary grants amounting to 300*l.* This recognition has enabled the Council to modify the terms upon which the School is opened, in the direction of materially reducing the cost to the locality visited, thereby extending the facilities for taking advantage of such instruction.

The success which attended the Society's Butter Schools was an encouragement to proceed still further in the same direction, and a scheme for the establishment of a Cheese School was formulated by the Agricultural Education Committee, and adopted by the Council, who made a grant of 350*l.* in furtherance of it. Suitable premises were secured at the Palace Farm Wells, and the School was opened on May 6th. The want of some such means of instruction is shown by the fact that since that date the School has had its full complement of students and applications for admission are still forthcoming, while further evidence has been supplied that the School is satisfactorily fulfilling its objects. It has been arranged to keep the School open until October 31st.

In the Experimental Department a series of experiments was successfully conducted during last year with reference to the effect of manures upon barley grown after wheat or other white straw crop, and the Board of Agriculture was pleased to

recognise the importance of this work by a grant in aid of 150*l.* The Society was again indebted to many landowners and farmers in various parts of the kingdom, who have not only provided land for the purpose of these investigations, but have carefully and satisfactorily carried out, at no little personal trouble, the scheme laid down by the Experimental Committee. This year the experiments are designed with a view to ascertaining what manures can be most advantageously used for the production of a good crop of mangolds, having regard also to their effect upon a succeeding crop of corn, and to meet the cost of this a special grant of 300*l.* has been made by the Society's Council.

The interest taken in the Society by the Southern Counties is shown by the large number of exhibits, both of stock, farm produce and implements on the present occasion, the aggregate comparing favourably with that attained on previous visits to the district. The stock entries comprise 57 horses, 371 cattle, 231 sheep, 85 pigs, and 450 poultry; whilst dairy produce, which was unrecognised at the last meeting in Kent, is represented on the present occasion by 83 entries. Wool and hops number 27 entries. The entries for horses are naturally affected by the fact of the Islington Show being held at the same time as the Society's Exhibition.

Since the Working Dairy has become a permanent feature of the Annual Meeting, the increasing interest displayed in it by those visiting the Exhibition, and its proved practical utility as a means of education, have led to its enlargement, alike with regard to its dimensions and its sphere of operations. Explanatory lectures and demonstrations with reference to dairy husbandry in all its branches are being given by recognised experts, and there are butter-making competitions on each day of the Meeting, the number of entries for which have risen from 73 in 1886 to 116 on the present occasion. The Council offer two gold medals for Appliances for determining the amount of Butter Fat in milk, and for testing the acidity in milk, for which there are five entries.

In this County, where fruit is so largely grown, the Council considered that prizes for improvements in the methods of preserving and packing fruit would be of service. Special prizes were therefore offered for these objects, but the Council regret that only three entries have been received.

A special grant has been made to the Kent Bee-Keepers' Association, to enable them to offer prizes for honey and bee appliances, and to give instruction and explanatory illustrations with regard to bee-culture.

In the Implmeent Department most of the leading agricultural

firms are represented, the space taken consisting of 5708 feet run of shedding, and 13,775 square feet of uncovered space.

The extent to which artists have availed themselves of the opportunity for exhibiting their works in the Society's Picture Gallery testifies that this section of the Art Department is fulfilling the objects for which it was originally instituted, and in this belief the Council have renewed the grant of 100*l.* to the Art Union with the view of promoting the sale of meritorious works. The Council are indebted to gentlemen who have added to the attractions of the Gallery by the loan of works of art for exhibition only and not for sale, and they have thus been enabled to exhibit examples of the works of Mr. Wyllie, A.R.A., whose connection with Rochester imparts a special interest to what, under any circumstances, would be artistically valuable.

The Council have particular pleasure in announcing that they have accepted an invitation to hold the Annual Meeting next year in the city wherein the Society was cradled and which has been its home for so many years. The warm welcome given to the Society by the City of Bath on the occasion of its Centenary Meeting in 1877 justifies a confident anticipation of a most successful gathering in 1891.

The Council have much pleasure in recommending that the Earl Temple be elected President for the ensuing year.

The Council beg to recommend the following for election as Members of Council for the years 1890–92, in room of those retiring by rotation:—

EASTERN DIVISION—J. H. Arkwright, T. Danger, J. Hill, J. E. Knollys, M. St. J. Maule, H. B. Napier, R. Neville-Grenville, Capt. J. D. Sherston, and E. W. Williams.

WESTERN DIVISION—C. R. Collins, J. H. Ley, R. Marker, S. P. Newbery, J. D. Pratt, Sir J. Shelley, Bart., Sir W. R. Williams, Bart., R. Wippell, and Col. A. Wyatt-Edgell.

SOUTHERN DIVISION—Col. G. Best, A. Brassey, A. F. M. Druce, A. Grenfell, G. Simpson, A. Stanford, F. Warre, C. Whitehead, F.L.S., and A. G. Williams.

ELECTED WITHOUT REFERENCE TO DISTRICT—J. D. Allen, E. H. Llewellyn, M.P., G. E. Martin, C. Naylor, J. A. Rolls, and H. D. Skrine.

The Council desire to express their thanks to the Mayor of Rochester, the High Constable of Chatham, the Hon. Secretary, and Members of the Local Committee, and the inhabitants of the city and neighbourhood generally, for the cordiality with which they have welcomed the Society, and the energy they have displayed in promoting the success of the Meeting.

In conclusion, the Council would earnestly impress upon each

individual Member of the Society the desirability of making an effort to increase the roll of membership, and of bringing home to others, and especially to tenant-farmers, the advantages the Society offers. The recent extension of its area of operations renders it absolutely essential that its income should be fully maintained, but, beyond this, an increasing membership affords substantial evidence of vitality, which is in itself a source of influence and strength.

II.—*Report on the Proceedings at the Rochester Meeting*, 1890. By R. Henry Rew.

Introductory.

After an interval of six years the Society revisited the fair county—the garden of England—which forms the easternmost limit of its district. This time, however, its tents were pitched not—as at Maidstone in 1884—deep in the green bosom of orchards and hop-grounds, but on the verge where met the kindred interests of agriculture and commerce, and surrounded by manifold tokens of the grim armament of war. One side of the irregularly shaped Showyard half embraced—so to speak—the grey walls of Fort Pitt, a commanding structure erected at the outbreak of war in 1803, but now used, not for purposes of offence or defence, but as a military hospital. From the knoll, the outlook was one of unusual interest and charm. Almost at one's feet the sluggish Medway widened away northwards to join the Thames estuary, passing the fine frontages of the Gun Wharf and the Dockyards of Chatham, which spread away in seemingly endless lines; on the left—*i.e.* westwards—lay the quaint old town of Rochester, with its castle and cathedral standing out above the house-tops; while close at the foot of the hill was the suburb of Troytown, forming a quiet link between the busy towns of Rochester and Chatham.

The Showyard was somewhat precipitous and irregular in shape, but the best use had been made of the available space. The main avenue led up a steep slope to the Band stand, and, beyond, to the Picture Gallery and the Working Dairy, all of which stood on the summit of the hill, and on the edge of the ditch which protected Fort Pitt.

In its extent, and also in its general character, the Show—as was indeed to be expected—much resembled that of 1884. The aggregate number of entries of live stock was curiously similar on the two occasions—741 at Maidstone and 744 at Rochester

—and there was an almost equally close agreement in the extent of the space occupied by implements. There was a material increase on the later occasion in the important department of produce, which comprised at Rochester nearly three times more entries than at Maidstone, while an altogether new section had been added for butter-makers, &c., which accounted for 116 entries. The Poultry Department was almost precisely the same in extent as at Exeter in the previous year, but considerably smaller than at Maidstone.

On the whole the Show, while it possessed, as the details will show, many features of special interest and local importance, cannot be claimed to have been above what may be termed the "average." There was a rather larger collection of implements, and a somewhat smaller entry of stock than at Exeter in 1889, but otherwise it might be said generally to rank at about an equal level with that Show, which it further resembled in being located at what exhibitors sometimes call a "one-sided"—meaning thereby a seaside or practically seaside—town.

The Opening.

In deference mainly to local opinion, the Show was arranged to commence on a Thursday and close on a Tuesday. The Monday to Friday and the Wednesday to Monday arrangements had both been tried with varying success, but this plan had the advantage of being absolutely novel and untried.

Accordingly it was about ten o'clock on the morning of Thursday, June 5th, that the Mayor of Rochester (Mr. J. Ord Moore), accompanied by the High Constables of Chatham (Mr. H. J. T. Browne) and Gillingham (Mr. H. Bullock), the Hon. E. Knatchbull-Hugessen, M.P., the Hon. Secretary to the Local Committee (Mr. G. W. Prall), and a large number of Members of the Corporation and civic officials of Rochester, arrived at the entrance to the Showyard. His Worship was met just inside the gates by the President (Earl Darnley), and most of the stewards and officers of the Society. After introductions had been made:—

The Mayor of Rochester, addressing the President, welcomed the Society in the name of the citizens of Rochester, and referred to the part which had also been borne by the inhabitants of Chatham and Gillingham in promoting the Show.

The President said:—"Mr. Mayor and Gentlemen, it cannot but feel somewhat strange to me, hitherto known as your near neighbour and only as such, to find myself at the head of men from the far West who have not only fixed their camp within your precincts, not only occupied a fortified position by which

in a military sense they hold your city and the adjoining towns at their mercy, but have also audaciously assumed the right to levy tribute on your peaceful citizens and others who may come within the grasp of their self-constituted dominion. But I assure you our intentions are far from warlike. We have no idea of conquest except conquering your kind regard. And if we levy tribute we are not like an army, for we offer in return that which we flatter ourselves to be an equivalent. I do not think I mistake the sentiments of those I represent when I say the Society rejoices extremely to find itself holding its annual Show in the ancient city of Rochester. When we consider the manner in which we have been received, when we look at the beautiful decorations in your streets, the invitations that lie on our tables, and especially at your presence on this occasion to welcome us and to emphasise that welcome by taking formal part in the opening of this Show, I think I may hazard the conjecture that the pleasure is a mutual one. I have no doubt we shall have an agreeable week, and a successful Show. It may be that when an Agricultural Show—be it Bath and West and Southern Counties or the Royal—is held in a corner of England, a great financial success is scarcely to be expected. This is certainly the case in Rochester. Look to the North. There is certainly an impassable barrier in the Thames, a river without bridges and with only a single ferry between Woolwich and the Nore. Then if you draw a line through Rochester direct north and south there is not a single point to the eastward that is so much as forty miles away from us. Thus Rochester is at a disadvantage. But the object of our Society is not to make money but to do good, and we are content to pay our way in the long run. Even in the financial respect, if favoured by the weather, we may hope for fairly successful results. It only remains for me to thank you, Mr. Mayor, very heartily indeed in the name of the Bath and West and Southern Counties Society, of which I have the honour to be President, for coming to open the Show, and to thank all those around you for the very kind manner in which the Society has been received at Rochester."

The High Constable of Chatham, on behalf of the Court Leet and himself, expressed sincere and hearty appreciation of the honour conferred upon Chatham by the Show being held there.

The High Constable of Gillingham also joined in the welcome, and expressed the hope that the receipts of the Show might be good.

The Mayor of Rochester then declared the Show open, and hoped it might have favourable weather and be a success.

The Attendance.

It was scarcely to be expected that the number of visitors at Rochester would be under any circumstances more than the average, and on the whole the total for the five days—48,314—was very satisfactory as indicating a large amount of interest aroused in the district. The following table shows the number of admissions and amount of receipts on each day of the Show at Maidstone, Exeter, and Rochester.

	Maidstone, 1884.		Exeter, 1889.		Rochester, 1890.	
	Admissions.	Receipts.	Admissions.	Receipts.	Admissions.	Receipts.
	No.	£	No.	£	No.	£
First day	5,028	662	3,415	499	1,634	268
Second „	3,926	496	7,215	911	1,846	230
Third „	4,547	556	5,775	722	17,172	832
Fourth „	22,636	1,108	17,141	837	19,764	953
Fifth „	8,417	404	19,054	922	7,898	380
Total	44,554	3,226	52,600	3,891	48,314	2,663

It will be observed that the attendance on the first and second days at Rochester was exceptionally small. Only once during the past twenty years—at Worcester in 1880—has the number of visitors on the two first days of the Show been so few. This would have been regrettable even had the circumstances of the case been similar to those of previous years, but they differed in a very material respect. Hitherto it had been the invariable rule that the price of admission should be 2*s.* 6*d.* for three and 1*s.* for two days; but at Rochester an alteration was made, and it was arranged that there should be two "half-crown days" and three "shilling days." This will account for the rise in the number of the admissions at Rochester, from under 2000 on the second day, to over 17,000 on the third day, and it also accounts for the small total amount of the week's receipts.

Happily, as Lord Darnley pointed out in the speech above reported, the Society does not reckon the making of money as its object, or estimate the success of a Show solely by the receipts at the gates.

LIVE STOCK.

It has been already remarked that the entries of live stock closely approximated to those at Maidstone. But, although this was so as regards the respective totals, there was a good

deal of difference in the representation of the various breeds, as will be seen from the following comparative table.

	Maidstone, 1884.	Newport, 1888.	Exeter, 1889.	Rochester, 1890.
Agricultural and Draught Horses	54	38	31	29
Hunters, Hacks, Ponies, and Harness Horses	33	92	118	28
	— 87	— 130	— 149	— 57
Cattle, Devons	36	36	64	19
" Shorthorns	70	80	38	38
" Herefords	36	58	56	46
" Sussex	78	39	48	49
" Jersey	77	122	152	126
" Guernsey	60	63	68	82
" Black Welsh	..	28	..	..
" Dairy	3	9	2	11
	— 360	— 435	— 428	— 371
Sheep	208	160	182	231
Pigs	86	85	78	85
Total	741	810	837	744

As regards the character of the stock it seems to have shown no falling off in any respect, the prize-winners being in almost every case well worthy of distinction, and the competition in the majority of the classes being keen.

Horses.

For Agricultural Purposes.—There were 29 entries in the six classes provided for Agricultural Horses. Of these, 9 were Clydesdales, 19 Shires, and 1 was cross-bred between a registered Shire horse and a registered Clydesdale mare.

Mr. Joseph Waltham, on behalf of himself and his fellow-Judge—Mr. W. H. Potter—makes the following Report, which with the simple insertion of the names of the animals tells all that need be desired about the horses and the way in which they showed in the ring:—

Class 1—*Agricultural Stallions*, which had travelled in Kent during 1890—had 8 entries, among which were 4 or 5 good animals. The first prize horse [Mr. J. S. Hodgson's "*Young Merry Monarch*," 8407] was a very heavy 3-year-old, with good legs and feet and fine action. The second prize was awarded to a big black [Mr. W. Gilbey's "*King Henry*," 7499] that moved well, but having lost the hair from his legs, was not in the best show form. The R.N. [Mr. P. A. Muntz's *Moulton Conqueror*] was very stylish, with nice legs and feet, but his bone was rather small.

Class 2—*Agricultural Stallions, foaled in* 1888—was a very poor one indeed.

Class 3—*Yearling Stallions*—contained 3 entries, all good animals; indeed the Judges considered the first-prize Colt in this Class [Lords A. and L. Cecil's "*Crusader*"] to be the Champion of the Show.

Class 4—*Mares*—was a very small one, consisting of two good Mares.

Class 5—*Fillies, foaled in* 1887—contained 2 excellent Fillies, the first-prize one [Lord Hothfield's "*Sowerby Lass*"] being an extraordinary animal.

Class 6—*Fillies, foaled in* 1888—although containing 8 entries, did not reach the high standard of quality attained by Class 5.

Hunters, Hacks, and Ponies.—The display of light horses was very disappointing. That the offer of prize money to the value of over 250*l.* should result in a "beggarly array of empty boxes," or of unfilled classes, and that little more than a score of animals should come forward to compete for it, is a fact which is as inexplicable as it is unsatisfactory. No doubt the competition of the Islington Horse Show had especial potency in consequence of its proximity, but even this seems insufficient to account fully for the unfortunate state of things. Mr. P. A. Muntz, M.P., who reported for himself and his colleague—Mr. J. M. K. Elliott,—dismisses the entries with the remark that they were "very limited in number, and generally speaking of an inferior character." Mr. Muntz attributes this "in a great measure" to the coincidence of the Islington Show. He adds that "the only class worthy of mention was that for Brood-mares for Hunters (Class 13), in which there were three exceptionally good animals."

Cattle.

The collection of cattle, with its 371 entries, was almost completely representative, though, as is now the rule, the Channel Islands' classes surpassed all others in numbers. As will be seen, the Judges in nearly every case speak highly of the character of the animals which came before them.

Devons.—After the exceptional display of the "Rubies of the West," which formed so prominent a feature of the Exeter Show, it was inevitable that there should be a great falling off when the Show was held so far from their native pastures. As a matter of fact there were but 19 entries, and 3 or 4 of these failed to present themselves. But as to the character of the representatives of the breed the testimony of the Judges in their Report is conclusive. Messrs. James Forrester and William Snell say:—

Class 21. *Old Bulls.*—Four entries, one absent. First prize [Mr. J. Farthing's "*Robin Hood*," 2305] drooped a little at the tail, but was otherwise of good symmetry, massive, on short legs, and of excellent quality. Second prize [Mr. J. F. R. Morris's "*Primrose Duke*"] was a straight level-topped animal, a little leggy, pins and colour showing the faintest suspicion

of the Sussex type. Third prize [Mr. Bickle's "*Fancy's Robin 2nd*," 1966] had gone a bit wrong in his hind quarters, but was deep, and of good quality.

Class 23. *Yearling Bulls.*—Here three only of four entries came forward. First prize [Mr. Skinner's "*Fancy's Gordon*"] is a very promising young bull of considerable depth, with rich quality, though a little narrow over the top of the hind quarters. Second prize [Earl of Dartmouth's "*Detective*"] rich in character of flesh, though scarcely enough of it, and a nice coat, but not quite evenly balanced. Third prize [Mr. Bickle's "*The Count*"] had good flesh, but his symmetry was inferior to the others.

Class 24. *Cows.*—Only two present, but both gems, though of different type. First prize [Sir W. Williams's "*Flower 2nd*"] is a lovely cow, with a wonderfully broad and even top, and without a bare spot, pure in North Devon type, and point by point superior to the other where the best joints lie. Second prize ["*Duchess 17th*," 8988] very little inferior to first-prize animal, has great depth and good quality, and is a credit to her breeder.

Class 25. *Three-year-old Heifers.*—Only one exhibit [Sir W. Williams's "*Flame 3rd*"], a grand heifer, with splendid fore quarters, and although a little patchy behind, would be hard to beat.

Class 26. *Two-year-old Heifers.*—Three entries. Here again we have two types, but the blue-blood one [Sir W. Williams's "*Friendly the Third*"], notwithstanding her inferiority in size, was so perfect in her symmetry, and carried such a wealth of flesh all through the high-priced joints, that we were obliged to put her magnificent rival [Mr. Skinner's "*Rosebud*"] second, with a slight feeling of regret. The third-prize heifer [Mr. Bickle's "*Queen the Fifth*," 9987] has good flesh, and is of some merit.

Class 27. *Yearling Heifers.*—Four entries, three present; all meritorious. First prize [Sir W. Williams's "*Fiction 2nd*"], a charming yearling, full of symmetry and quality, and likely to maintain her character. Second prize [Mr. Skinner's "*Rosebud 2nd*"] a grand heifer with good broad top and lovely coat, a little wanting in depth of fore quarter. Third prize [Mr. Bickle's "*Beatrice 7th*] a sweet heifer, but with scarcely breadth enough of hind quarter.

In addition to this interesting criticism of individual animals, the Judges observe generally that, "though the numbers were small, the quality was so excellent that we felt we could specially recommend the removal of the restriction which withholds the second and third prizes in cases of insufficient entries." This "special recommendation" was in fact made—and adopted—in five out of the seven classes. It may be of interest to note that Sir W. Williams sent only four entries, and carried off four first prizes.

Shorthorns.—The Shorthorns mustered precisely the same number of entries at Rochester as they did in the previous year at Exeter. Kent is in fact as remote as Devon from the chief strongholds of the breed. Mr. Attwater, one of the Judges, remarks on this fact as explaining the somewhat moderate number (38), but he observes, "this was in a great measure counterbalanced by the superior quality of the majority as well as by the absence of inferior animals." The interest of the Show was for Shorthorn men enhanced by the presence not only

of most of the well-known "cracks," but also of the representatives of famous breeders, which were looked to as the coming champions of the year. Mr. Matthew Savidge, writing in August, remarks that the Shorthorn classes "contained animals of exceptional merit, so good that some of the prize-winners have continued to be amongst the best at the principal Agricultural Shows." He specially refers to those sent from the herds of Mr. Brierley, Mr. Thompson of Inglewood, Mr. Handley and Mr. J. D. Willis. Of the last-named breeder, he observes that "he bids fair with his large herd to clear the way for some years."

Mr. Attwater gives some details of the Classes, from which the following notes are taken :—

Class 28. *Old Bulls.*—First prize [Mr. Willis's "*Hercules*"], true, substantial, and level. Second prize [Mr. Darby's "*Proconsul Pippin,*" 56,360], good back and rib. Third prize [Mr. Brierley's "*Bangle*"] a thrifty animal of good quality.

Class 29. *Two-year-old Bulls.*—Well headed by first-prize animal [Mr. Willis's "*Douglas*"]; second prize [Mr. Brierley's "*Martinet*"], and third prize [Mr. Handley's "*White Pasha*"], following closely.

Class 30. *Yearling Bulls.*—Three promising youngsters. First prize [Mr. Willis's "*Count Lavender*"] took the championship; second prize [Mr. Brierley's "*Viscount Knightly*"] and third prize [Mr. Handley's "*Ingram's Pride*"] well deserving their respective positions.

Class 31. *Cows.*—Five grand cows, some of which were not so much like milkers as could be wished; however, it was months since most of them had calved, for which some allowance must be made.

Class 32. *Three-year-old Heifers.*—First prize [Mr. Brierley's "*Rosedale Graceful*"] a good white; second prize (Mr. Hayward's "*Empress of Southill*"] in moderate condition only.

Class 33. *Two-year-old Heifers.*—Six entries, two absent. First prize [Mr. Brierley's "*Grace Darling*"] and second prize [Mr. Thompson's "*Windsor's Beauty*"] were beautiful heifers.

Class 34. *Yearling Heifers.*—Eight entries, one absent. There was not the same general good quality throughout this class, and the prize-takers were decidedly ahead.

Herefords.—There were 10 entries less of Herefords than at Exeter, but the fact that as many as 46 were sent so great a distance from home was creditable to the enterprise of breeders. All, with the exception of two or three from Mr. Palmer's herd in Hertfordshire, came from the Welsh borders. When last year the greater representation of Herefords than of Shorthorns was noticeable, there was a ready explanation in the comparative proximity of Devonshire to Herefordshire; but it would be impossible to advance the same excuse on the present occasion.

The Judges in this section, without going into great detail, speak, as will be seen from the following notes, eulogistically of the character of the display :—

Class 35. *Old Bulls.*—One entry. First prize [Mr. Palmer's "*Bombardier*"] a good animal, and well worthy of the prize.

Class 36. *Two-year-old Bulls.*—First prize [Mr. A. E. Hughes's "*Endale*," 13,773], and second prize [Mr. Cook's "*Grove Wilton 4th*," 13,846], both large, stylish, and superior animals. The whole Class good.

Class 37—*Yearling Bulls*—contained several good animals, and some that will show better when more developed.

Class 38. *Cows.*—Lord Coventry's "*Rosewater*" (first prize) retains all her early bloom, and is perfection at all points. Second prize [Mr. Fenn's "*Bravura*"] is level, and has great substance and merit. Third prize [Mr. Crawshay's "*Cyfarftha Violet 2nd*"] level and good.

Class 39. *Three-year-old Heifers.*—First prize [Earl of Coventry's "*Ladywood*] a grand animal; Second prize, Mr. Edward's "*Psyche*"; Third prize, Mr. Godsell's "*Cornflower*"; and Commended, Mr. Godsell's "*Bright Eyes*," all meritorious.

Class 40. *Two-year-old Heifers.*—A good Class.

Class 41. *Yearling Heifers.*—Fourteen entries, two absent. First prize [Mr. Green's "*Sunbeam*"] good; in blooming condition. Second prize [Mr. Taylor's "*Lady Lavender*"] a little beauty, but below par in condition, and lame. Third prize [Mr. Fenn's "*Princess of the Teme*"] has great substance, and is very fat. This is a good Class, containing several animals of great promise.

Sussex.—The Sussex cattle were the most numerous of all the "beef" breeds, mustering, as they did, 49 entries. Still it was curious that in the county adjoining their home there should be only one entry more than when the Show was in the far West in the previous year. It was generally agreed, however, that the character of the breed was worthily maintained by the animals which were sent. There were, as one writer put it at the time, "few absentees, and fewer still that should have been absent." The classes were well filled, the competition was close, the prize-winners were some of the best specimens of the breed which have yet been brought out, and there were none sent undeserving of notice.

The Report handed in by the Judges—Messrs. A. Heasman and R. Hamshar—stated that they considered the breed was "well represented." In the Bull Class there were four "useful animals," and a referee had to be called in before the first and second prizes could be awarded. In the Two-year-old Bull Class the Judges thought there were "many good animals," the first-prize winner (the Aylesbury Dairy Company's "*Lord Oxeye*") being especially so. Of the Cows, the Judges pronounced the prize-winners to be "exceedingly good specimens of this useful breed," and they apply the same remark to the three-year-old heifers, but adding in the latter case that the third-prize animal (Mr. Field's "*Primrose*," 4121) was "good in fore quarters, but disappointing behind." The Two-year-old Heifers formed "a particularly strong class," as was indicated by the commendation of the whole. Of the Yearling

Heifers the Judges say that they were "a good class, and nearly all worthy of special notice."

Jerseys.—Of late years the Jersey Classes of the Society's Shows have invariably been well filled. At Rochester the number of entries was 126, being nearly double that at Maidstone in 1884. This fact is fairly indicative of the increased popularity of the breed. The character of the entries at Rochester is vouched for by the Judges as having been excellent all round, especially in the Heifer Classes. The Classes for Bulls, except that for Yearlings, were weak in numbers, and the Judges observe that "this deficiency was not compensated by unusual merit in the few specimens present." Messrs. A. T. Matthews and James Long add that in the Yearling Class they found "a splendid collection of 20 young animals, very few of these were of indifferent quality, and fully half of them were well deserving of prizes. In reference to the Old Bull Class, Mr. Long, in a separate Report, observes that two of the animals possessed high merit, and that in the Two-year-old Class the first-prize animal (Mr. Blyth's "*Sir Joseph*") was level and of high merit throughout. The excellence of the Yearling Bulls was undeniable, and this, of course, is especially satisfactory. Mr. Long remarks, that "breeders appear to be paying more attention to form, and especially to the teats, a point which is considered of some importance even in the male; there was, however, too great an absence of colour in the Young Bulls, which excelled more in form than fineness of quality."

CLASS 52, for Cows, was noteworthy not only for the number of entries therein (nineteen), but also for the fact that they comprised many of the best-known animals in the Show-ring. The competition was accordingly very close. Mr. Long observes, with reference to them, that "they were principally typical Jerseys of beautiful form, and generally with good udders, and this is a point which Jersey breeders might pay more attention to with advantage. As the Jersey is above all a dairy cow, the udder might fairly count for more than it appears to do."

The Three-year-old Heifers (CLASS 53) were considered by the Judges to be "scarcely so uniformly good a muster as the older ones." At the same time the best half-dozen animals in this Class, says Mr. Long, "excelled the cows in the other, but they were not their equals in general shape and quality, as denoted by horns, skin, and colour."

CLASS 54—Two-year-old Heifers—was a strong one, and the 22 animals were mostly good-looking and of very promising dairy capacity. "As they entered the ring," write Messrs. Matthews and Long, "we remarked that we had seldom seen a

better lot of udders. A closer inspection, of course, revealed faults, but on the whole they were an excellent class."

In CLASS 55, for Yearling Heifers, there were "20 very smart youngsters." The Judges observe, "that in some few cases they had been somewhat overfed—a dangerous liberality towards young Jersey heifers, whose milking and non-fattening propensities should be early developed." On the whole collection of Jerseys Mr. Long observes that they formed one of the finest displays which he has seen at the Society's Meetings.

Guernseys.—The number of entries of Guernseys increases in almost steady progression year by year, and although they do not yet rival in multitude the Jerseys, they invariably make a striking display, and one which usually outnumbers every other breed that does not also hail from the Channel Islands. As compared with the Maidstone Show the entries at Rochester showed an increase of one-fourth, and exceeded that at Exeter by fourteen. But whereas at Exeter Guernseys were less than one-half the number of the Jerseys, at Rochester they mustered two-thirds of the total of their rivals. Whether this difference is to be attributed to the distribution of the several breeds in the South of England, or to any excess or diminution of enthusiasm on the part of the respective breeders, it would be difficult and not particularly profitable to decide.

The Judges, Messrs. William Ashcroft and John Carré, make a detailed Report, which is given below practically in full:—

CLASS 56. *Old Bulls.*—First prize [the Express Dairy Company's "*Bonnie Laddie*"] a lengthy well-developed bull, with well-placed false teats. Second prize (Sir F. Montefiore's "*Black Prince*"], is very handsome looking. Third prize [Messrs. Fowler and De la Perrelle's "*Advantage*"] a neat bull, not showing the growth and character of the first two. Reserve [Mr. G. Long's "*Original*"] a good dairy bull, but rather plain.

CLASS 57.—First prize [Mr. Glynn's "*Frolic 2nd*"] a very good bull all round, with the exception of a little coarseness in setting-on of tail. Second prize [Lord Montagu's "*Conqueror*"] a good-bodied bull with well-marked escutcheon, but rather heavier in the head. Third prize [Col. Macleay's "*Pepin 4th*"] a rich animal, somewhat coarse in head and throat, and a little drooping behind. Reserve [Sir F. A. Montefiore's "*Loftus*"] a neat bull, well marked.

CLASS 58. *Yearling Bulls.*—First prize [Mr. Baker's "*Sir Bevys*"] a level symmetrical bull with good hind quarters, slightly coarse in horn. Second prize [Col. Macleay's "*Papageno*"] a level good animal, a little flat-sided. Third prize [Mr. Morris's "*Esquire*"] a fairly good bull, blemished with bottle-shape false teats.

CLASS 59. *Cows.*—A small class of fair merit. First prize [Mr. Glynn's "*Fairy 2nd*"] an old cow, decidedly the best representative of the breed in the class, whose fine chine, outline, and shape, and symmetrical udder milking up like a glove, are difficult to beat. Second prize [Mr. Forster's "*Antona*"] a good-bodied animal, with fine escutcheon and good milking-points, but somewhat spoiled by a dropped udder, was placed second. Third prize [Col. Macleay's "*Francisca*"] a neat cow, showing not quite so much breed-

ing; Reserve [Sir F. Montefiore's "*Queen of the Isle*"] running her very closely.

Class 60. *Three-year-old Heifers.*—First prize [Mr. G. Long's "*Nora 3rd*"] rather high on the leg, showing good quality and fine fore hand; looks like growing into a handsome dairy cow. Second prize [Mr. Glynn's "*Favourite 9th*"], a heifer with good top line, beats Express Dairy Company's "*Swissville Lass*"] (third prize) in fineness of head and chine, and set of tail, though the latter heifer, which was due to calve, showed the best developed udder of the two.

Class 61. *Two-year-old Heifers.*—First prize [Express Dairy Company's "*Lily of Guernsey 3rd*"] a rich heifer, with most taking appearance and well-developed udder. Second prize [Col. Macleay's "*Beatrice*"] a little heavier in character than first-prize heifer. Third prize [Mr. Glynn's "*Amelia*"] a lengthy straight heifer of good promise.

Class 62.—*Yearling Heifers*—formed a strong Class, the majority having teats well placed, and the appearance of growing into good heifers; but as animals at this age are proverbially deceitful, it is hardly advisable to comment on them further.

Dairy Cows (any Breed).—In the Class for Dairy Cows in-Milk, of any Breed or Cross, to be specially judged for their milking qualities, there were 11 entries, but 5 of them were also entered in other classes. Mr. Savidge, one of the Judges of this Class, observes truly enough that "there is always a fight in the milking class where all breeds compete, and we frequently find a small mean-looking animal, whose value to the butcher would not reach five pounds, puts in a great claim to the prize entirely from her larger flow of milk." The breed chiefly represented in the Class was Shorthorns, and there were also four Guernseys, one Jersey, and a Cross-bred. The last-named, sent by Mr. H. A. Brassey, was a cross between a Jersey and an Ayrshire—a combination from which milking qualities might reasonably be expected—and to her the Judges awarded the first prize. The second prize was taken by a pedigree Shorthorn; and the third prize by an Island-bred Guernsey.

Sheep.

The collection of Sheep was on the whole very good, and of considerable interest. Perhaps never before has so excellent an exhibition been made of the big useful sheep which hold unchallenged supremacy on the Kentish Marshes, while the Southdown Classes were also especially well filled. The total number of entries (231) exceeded that of the previous year by 50, while it was also 23 in excess of the total at Maidstone.

Leicesters.—There were only 8 entries—from two flocks—in the Leicester Classes, and they did not call for any special remark.

Cotswolds.—In this breed also two breeders were responsible for the whole display, which comprised 10 entries.

Mr. Robert Garne, one of the Judges, observes that the sheep were of "fair average quality," and that the Shearling Ewes were "decidedly the best specimens of the breed."

Romney Marsh or Kent.—The 69 entries of Romney Marsh Sheep made an admirable display of this serviceable breed, and they comprised many which were certainly of the highest merit. As was observed above, probably no better exhibition of the breed has been made. At Maidstone the number of entries was 41, or 28 below what they were on the present occasion. Mr. Garne remarks that the first prize Two-shear Ram (Mr. F. Neame's) was "a very good representative of the breed." The Shearling Class, with 26 entries, gave the Judges a good deal of trouble, and Mr. Garne observes that it contained several animals which were of "considerable merit." He adds, that "the Classes for Lambs and Ewes were well represented both as regards numbers and quality."

Other Longwools.—The 18 entries in the three classes under this heading comprised only Devon Longwools, and Mr. Garne reports that "they made a good show, some superior animals in each of the classes. The Shearling Ewes being especially nice."

Southdowns.—There were 50 entries, of which 23 were Shearling Rams. Mr. Hugh Penfold—one of the Judges—reports that the first-prize Shearling Ram (H.R.H. the Prince of Wales's) was "far away from all the rest, being very good in his wool, with a good well-covered head, and a deep-fleshed sheep. The second-prize sheep (the Pagham Harbour Company's) was a deep-fleshed sheep with very good wool, rather weak in his neck and head. There were other useful sheep which might have stood higher had they been better in their wool. The Shearling Ewes were a very good lot. The first-prize pen (Mr. E. Ellis's) were deep, good-fleshed ewes; they were closely followed by the second-prize pen (Mr. Toop's), but these failed in their fore-quarters. The Ram Lambs were big and good. Respecting the first-prize pair (Mr. Ellis's) one was a splendid lamb, the other failed in his wool. The second-prize pen (Mr. Toop's) were a little bigger, but were too open in the shoulders."

Of the Southdowns generally Mr. F. M. Jonas, the other Judge, observes that they were "not so good in quality as usual," the chief fault found being with the wool.

Hampshire Downs.—This breed mustered a score of entries which were uniformly good throughout. Mr. W. Newton came to the front with two Shearling Rams and a pen of Ewes, which had previously carried everything before them at the Oxford Show, and were commonly considered as the best lot of

Hampshires which had been brought out for some time. Unfortunately their victorious career was brought to an untimely end just before the Royal Show, by the burning of the railway van in which they were being conveyed. The Judges coincide in their enthusiasm respecting the first-prize Shearling. Mr. F. M. Jonas writes that he was "a very grand sheep," and Mr. Penfold observes that he was "one of the best of that breed we had ever seen; he was remarkably good on his back, handling like a Southdown." Mr. Penfold also observes that Mr. Newton's second-prize Shearling was "a good sheep, and so were the Ram Lambs and Shearling Ewes." Mr. F. R. Moore was first in the Ram Lamb Class. Mr. Jonas remarks that "the Shearling Ewes, although only three pens, were all good, and especially the first-prize pen" (Mr. Newton's).

Shropshires came out well with 32 entries. There was a capital class of 19 Shearlings in which the first and second prizes were taken by Mr. Inge, with what the Judges term "matchy sheep." The third prize was taken by Mr. G. Graham with a Ram "of nice quality," the class altogether being "excellent." The Judges, Messrs. C. R. Keeling and John Bryan, jun., report that the Ram Lambs (7 entries), were "not so good as they expected to find them," but the six pens of Shearling Ewes were "of great merit, well representing the breed."

Oxford Downs.—This breed made a very limited show, only two flocks being represented. Mr. George Adams took all the prizes, being only opposed by Mr. R. W. Hobbs in the Ram Lamb Class and having the other two classes to himself. The Judges considered that there was "no special merit" in the Shearling Ram Class, but the two prize pens of lambs (Mr. Adams's) were "strong and good," and the reserve pen (Mr. Hobbs's) "showed a lot of quality." The Shearling Ewes, though there were only two pens, "thoroughly deserved the second prize," which the Judges accordingly specially recommended.

Somerset and Dorset Horn.—Three flocks of this breed were represented, Messrs. Culverwell Brothers taking the three first, and Mr. J. Kidner the three second prizes. The Judges considered the Rams to be of "average merit," the two pens of Lambs to be "each worthy of a prize," and the Ewes to be "an excellent class," the two prize pens especially so.

Mountain.—There were 6 entries in the two classes provided in this section, all of them being Exmoors. In the Ram Class Sir W. Williams's Shearlings beat Mr. Stanley's Two-Shears. In the Ewe Class Mr. Stanley had two pens which the Judges thought "very neat."

Pigs.

The Judges of Pigs, Messrs. Richard Fowler and Walter J. Henman, handed in a detailed Report on their Classes, which was as follows:—

Berkshires.—Class 97. *Boars farrowed in* 1887 *or* 1888.—The first prize (Mr. J. Mills's) and second (Mr. J. P. King's), were useful pigs.

Class 98. *Boars farrowed in* 1889.—The first prize (Mr. Fricker's) a very good pig; the second prize (Mr. J. P. King's) a useful pig, with very plain head. A moderate Class.

Class 99. *Breeding Sows.*—The first prize (Mr. Fricker's) a good type of a Berkshire Sow. Second prize (Mr. Benjafield's) rather lacking in quality. Reserve (Mr. J. P. King's) a good sow, excepting head. A very good Class.

Class 100. *Breeding Sows farrowed in* 1890.—The first prize (Mr. H. A. Brassey's) and second prize (Mr. Benjafield's) very good pens of two breeding Sow Pigs.

Small Black.—Class 101. *Boars farrowed in* 1887 *or* 1888.—Poor competition.

Classes 102 and 103.—Only one entry in each class.

Class 104.—No entry.

Large White.—Class 105. *Boars farrowed in* 1887 *or* 1888.—The first prize (Mr. S. Spencer's) and the second prize (The Guardians, Prescott Union) very fine pigs. Reserve (Mr. Spencer's), a good large pig.

Class 106. *Boars farrowed in* 1889.—The first prize (Mr. S. Spencer's) exceedingly good pigs, worthy of a better competition. Reserve and V.H.C., the Guardians, Prescott Union; remainder of class of no particular merit.

Class 107. *Breeding Sows.*—The first prize (Mr. C. E. Duckering's) and second prize (Mr. S. Spencer's) very good specimens of the Large breed Sow.

Class 108. *Breeding Sows farrowed in* 1890.—The first prize (Mr. S. Spencer's) exceedingly good pigs. Second prize (Mr. C. E. Duckering's) of a full character.

Middle White.—Class 109. *Boars farrowed in* 1887 *or* 1888.—The first prize (Mr. S. Spencer's) good in all points, a fine specimen of the Middle White breed. Second prize (Mr. A. C. Twentyman's), a useful pig.

Class 110. *Boars farrowed in* 1889.—The first prize (Mr. S. Spencer's) a good pig; second prize (Mr. A. C. Twentyman's) a useful animal.

Class 111. *Breeding Sows.*—The first prize (Mr. T. Strickland's) an exceedingly well-made pig; the second prize (Mr. S. Spencer's) very handsome, with fine quality; the reserve also (Mr. S. Spencer's) possessed such great merits that the Judges strongly recommended it for a third prize, which was granted by the Council. They were three very fine sows.

Class 112. *Breeding Sows farrowed in* 1890.—The first and second prizes (Mr. S. Spencer's) were four exceedingly good young sow pigs.

Small White.—Class 113.—Only one entry.

Class 114. *Boars farrowed in* 1889.—The first and second prizes (Guardians of Prescott Union) good types of their class.

Class 115. *Breeding Sows.*—The first and second prizes (Hon. Mrs. Heyndall-Ingram's) also good types of their class.

The Judges conclude their Report with the following Suggestion:—

"In the opinion of the Judges it is a question for the consideration of the Council of this and other Agricultural Societies, as to the advisability of withdrawing prizes from the classes of small-bred pigs, which can scarcely be considered rent-paying animals, and adding to the amount of the prizes for the larger and more useful and necessary breeds."

PRODUCE.

The number of entries in the Classes for Produce was as follows:—

	Maidstone, 1884.	Newport, 1888.	Exeter, 1889.	Rochester, 1890.
Hops	45	..	..	12
Wool	..	..	..	15
Cheese	..	42	46	25
Butter	..	87	81	52
Cream	..	8	14	6
	45	137	141	110

Hops.—A report on these will be found on pages 42, 43.

Wool.—There was rather a small competition in the wool section, especially in the Short-Wool Class. Mr. F. Prentis, one of the Judges, in accounting for this, says:—

"When the time of the year is taken into consideration one cannot wonder at it, as our shearing in Kent does not commence with the general flock-masters until June, consequently they had very few fleeces to select from, and it is very difficult to judge wool on the sheep's back, as must in some cases I know to have been the case, and farmers, as a rule, are not good judges. Wool for show requires to be selected from a bulk—when one could go by comparison, and get uniformity—unless it be selected by an expert. However, under the circumstances, the selection I consider was, as regards the Kent wool, good."

Class 120. (*Longwool*).—Mr. Prentis observes that the first-prize fleeces (Mr. Wotton's) were "an excellent description of wool possessing capital qualifications," and that the second-prize fleeces (Mr. F. Neame's) were also "a good class of wool and meritorious," as also were No. 762 (Mr. Wotton's) and No. 756 (Messrs. R. and G. Harrison's), the latter "a deeper class, not Kent." The three first-named lots were all Kent wool. His colleague, Mr. Haddon, observes that "the samples of Kent wool were good generally, but No. 763 (first prize) was exceptionally so. No. 756, lustre hog, was also very good."

Class 121. (*Shortwool*).—Mr. Haddon remarks that the competition was very meagre, the first prize lot (Lord Darnley's) being "a good sample," but the other two entries not calling

for any special remark. Mr. Prentis observes that "he cannot say much for the Down wool," and he adds :—

"I know that our farmers were afraid to come into competition with a Sussex Exhibitor, which was natural enough, as a good selection from a South Down breeder would be pretty sure to carry the palm. However, there were no exhibits to compete, and the first-prize lot in this Class was of sufficient merit to carry it."

Cheese.—There were 25 entries in the four classes for Cheese. Mr. John Allen makes some interesting remarks on the classes which came before him as Judge. He says :—

"I was sorry to find such a limited number of entries, considering the handsome amount given by the Society in prizes. This may, perhaps, be partly accounted for by the Show being held so far away from the cheese-making districts, and partly by the time of year, as it is between the seasons, viz., too late for old cheese—most makers having sold some months previously—and much too early for new cheese made in 1890. In such young cheese it sometimes occurs that a coarse quality which for the day cuts more forward, but will not improve and does not give satisfaction to the consumer, is given the prize in preference to some which are really of a much higher standard and worth more money in the trade, but require a little more time to develop their fine qualities. For some years past we have not found that general improvement in the standard of English cheese which might have been expected from the efforts made by the various Agricultural Societies."

This latter opinion, coming as it does from one whose long experience and wide practical knowledge entitle it to respectful attention, is a little discouraging, but if it be well-grounded it is highly desirable that it should be candidly expressed and seriously considered. Mr. Jubal Webb, after referring to the effect of the time of year on the number of entries, remarks that

"The new cheese was hardly forward enough to judge as to the probabilities of development, while the old was in some cases, as regards flavour, quite ready for the consumer, some very fine exhibits being amongst the number."

Butter and Cream.—The Judges both speak in high terms of the character of the Butter exhibited, which was sent from all parts of the South and West of England, only one entry out of the 52 coming from the county in which the Show was held. Mr. Jubal Webb reports :—

"The butter was, taken as a whole, worthy of high commendation, and in some cases so perfect in make, texture, and flavour as to entitle it to the highest praise on the part of the Judges. In fact, the great advance made as regards quality during late years has been very remarkable, and shows that the effect of these Shows where friendly rivalry in the art of making fine butter is fostered and encouraged, tends to raising the standard and perfecting the output of an article that has hitherto suffered in sale when pitted against foreign production. To be successful in the struggle we must devise ways

and means by which we can put upon the English home market larger quantities of fine butter, uniform in colour and fine in flavour, within a short time of its being made. This, I think, can only be attained by blending the finest kinds directly they are made and before making into prints and rolls, taking the butter off the farmer's hands directly it leaves the churn. The packing, manipulating, and sending forward *should be*, as it is abroad, a separate business."

Mr. Webb's earnest advocacy of uniformity, and his suggestion of the adoption of the French system of blending are not new, but they are none the less highly important. He has been for years past the apostle of "uniformity," and there can be little doubt as to the value of his reiterated advice.

Mr. Allen's Report on the Butter Classes is as follows:—

"I was pleased to find a general improvement in the quality of the butter exhibited, although the highest standard is as yet reached by only a few of the makers. Some of the exhibits were good in quality, flavour and colour, but had not been properly worked to get out the moisture and consequently would not keep. We rarely now find a sample of rank, bad-flavoured butter, such as used to be very common a few years since; but I regret to say there is still a considerable quantity of that sort made, if not exhibited."

POULTRY.

The comparative entries in the Poultry Department were as under:—

Maidstone, 1884	613	Exeter, 1889	463
Newport, 1888	429	Rochester, 1890	450

The following report by Mr. James Dixon on behalf of himself and his colleague, Mr. Tegetmeier, speaks for itself.

"The number of entries was 450, and the general quality was quite equal to any previous years. The arrangement of the pens was everything that could be wished for and the exhibits were well attended to.

"In **Cochins** the classes were really of high character, and were in very good condition, the same may be said of the **Brahmas**, the Lights we thought better than the Darks; the entries were also larger. **Langshans** were very full classes and the quality throughout was of a high character, an improvement upon previous years. **Plymouth Rocks** were fairly good. **Wyandottes**, very small entries and quality indifferent. The **Chicken** classes were of much merit for so early in the season. **Spanish** were very fine and in high condition. **Minorcas** very good in both classes and in fine condition. **Leghorns** were fairly good. **Houdans** very small classes and quality not of the best. **Polish** entries very small, but quality really good. The **Hamburg** entries were very small, but the quality unusually good. The Blacks were most numerous and the brilliancy of the plumage in nearly every exhibit was everything that could be wished for. The **Chicken** classes of the smaller breeds were well filled and the quality for so early in the season was very promising. The **Dorking** classes were above the average and the entries large; Silver Greys and Whites were grand classes. The **Game** classes were well filled and the quality throughout of the greatest

merit. **Malays** were not numerous, but the exhibits were very meritorious. **Indian Game** were a really grand class and in the very best of condition. The **Duck** and **Turkey** classes were fairly good, but entries small. The black and white rose-combed **Bantams** were very large classes, and the general quality very superior. Game Bantams had large entries and the quality of the exhibits quite up to the average of the largest shows. Any other variety of Bantams contained some of the best Silver-laced ever seen, also some very nice Japanese."

IMPLEMENTS.

The collection of implements and machinery was very complete and representative, although it did not comprise many actual novelties. Still there were several machines and appliances which were more or less new, either in principle or in detail, and a brief notice of these must find a place in the Journal. Naturally in the midst of the chief hop county, implements connected with hop cultivation were numerous, while the prominent position taken up by the Society in connection with dairy work rendered it but natural that all the chief makers of appliances for the dairy should be well represented. To these two sections of the exhibition, therefore, it is only fitting that this report should especially allude, while with reference to more general machinery, the exigencies of space demand a somewhat rigid selection.

The relative size of the Implement Department at Rochester is indicated by the following comparison:—

	Maidstone, 1884.	Newport, 1888.	Exeter, 1889.	Rochester, 1890.
Machinery in Motion, feet run ..	994	812	616	840
Seeds, feet run	384	206	99	146
Agricultural Implements, feet run ..	4,347	3,767	3,465	3,510
Cattle Foods, Fertilisers, &c., feet run	549	594	451	547
Carriages & Miscell. Articles, feet run	850	1,200	735	665
Open space for Hay Barns, Greenhouses, &c. square feet	12,276	15,795	11,792	13,775
Total	19,400	22,374	17,158	19,483

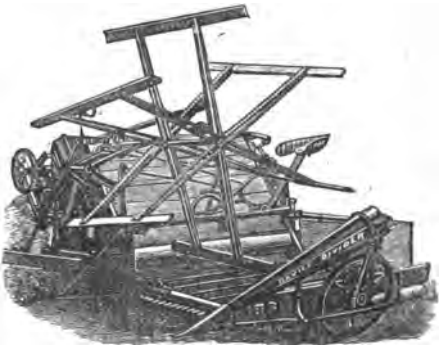
It will be seen that the Show of 1890 considerably exceeded that of 1889 in extent, while in its representative character it has probably seldom been surpassed in the Society's history.

Farm Implements and Machines.

Naturally the majority of the appliances which come fairly under the category of "new" are attachments which go to perfect a farm implement for special purposes. Of such a

character is the patent revolving Divider, which was exhibited by a Cornishman, Mr. J. N. Davies. This is intended to deal with one of the chief troubles of a corn-land farmer, viz., laid and twisted crops. This difficulty tempts him in some seasons to give up his reaper in despair, more especially if it is a self-binder. The invention consists of a slightly tapering wooden cone fluted parallel with its length, and having an iron point. It is about 2 feet 6 inches in length, and its diameter at the small end 3 inches, and at the large end 6 inches. It is fixed on the upper edge of the dividing board, and the revolving motion—which is towards the platform—is given to it by means of a chain from the wheel which carries the dividing shoe. It thus assists the corn to fall properly on to the platform, and prevents the loose locks of corn from falling off the divider on to the stubble.

Fig. 1.—*Davies's Revolving Divider.*



The Divider is shown in the illustration (Fig. 1) attached to a self-binder, as it was exhibited at Rochester.

The world does move, and the practice of selling cattle by live-weight does make progress, slow though it be. Mr. Albert Pell's interesting and convincing article in the R.A.S.E. Journal last year proved this much. Among those who have been foremost in meeting the growing want for weighing apparatus, Messrs. W. and T. Avery have been conspicuous, and they had at Rochester a number of weighing machines for cattle, fitted with their ingenious self-registering steel-yard, which prints both gross and tare weight on a ticket. Their latest invention, however, is a combination of a cart and a weighing machine. The cart can be used for all ordinary purposes independent of its weighing capabilities, but the load can at any time be weighed by bringing the levers and other balancing mechanism into gear by merely lowering a handle at the side.

The recording steelyard is enclosed in a box in the front of the cart. Another application of the same principle was exhibited in a weighing crane, which attracted much interest. By means of this a load can be lifted and moved in the ordinary way, and weighed in transit.

Messrs. Harrison McGregor and Co. had still further improved their well-known "Albion" mower and reaper, by fitting it with a new patent oiler for the crank pin. It consists of a chamber fixed on the outer end of the connecting-rod head, separated from the bearing of the crank-pin by a partition. In the upper part of this partition is a very small hole, communicating from the oil chamber to the bearing, but above the oil level, so that when the machine is out of gear, the oil ceases to flow from the chamber to the bearing. When the oil is agitated by the working of the machine it passes through the small hole in just sufficient quantity to keep the bearing lubricated, but without the waste which occurs when the oil flows freely on the bearing at all times. Another patented improvement in this machine consists of an extra or "compensating" chain in the lifting arrangement so that, with the same expenditure of power, the inner end of the finger-bar is raised some 2 or 3 inches higher than when lifted by the locking lever chain alone, and the whole finger-bar is thus raised more nearly level.

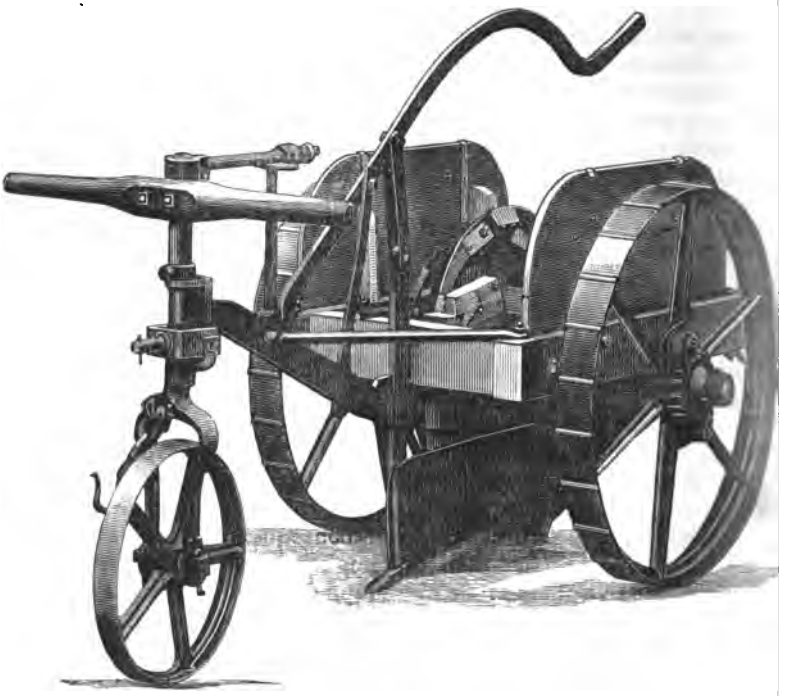
Messrs. Barford and Perkins have long been well known for their field rollers, but they have now brought out a novel combination by means of which the same implement is contrived a "treble debt to pay." It is: (1) an ensilage roller, (2) a field roller, and (3) a Cambridge clod-crusher. The cylinders are of wrought iron, and by simply removing a plug each can be filled with water, thus doubling the weight without increasing the friction on the bearings (and consequently the draught of the implement) as the plan of weighting the frame inevitably does. The cylinders alone are adapted for rolling ensilage, and in a few minutes the roller-frame and shafts can be attached for use on the land. The Cambridge rings slip over the cylinders, thus converting them into a clod-crusher of adjustable weight. The method of rolling ensilage stacks has become popular in many parts, and Messrs. Barford and Perkins therefore supply a want, while at the same time the farmer has the advantage of getting a roller which is of use at other times as well as when he happens to be making ensilage.

A new apparatus for cleaning chaff from dust and other refuse was exhibited by Messrs. West and Co. There is no doubt that the object aimed at is a very desirable one in the interests of stock, and especially of horses, who suffer much from the dirt contained in their food. Messrs. West's appliance may be

attached to any chaff-cutter, and it effectually draws out by means of a fan all dirt from the chaff.

A new machine for planting potatoes was shown by Messrs. Miles and Arter (Fig. 2). It was exhibited in two sizes, for planting a single and a double row respectively. The single row machine had only left the works three weeks at the time of the Show, and it was claimed that it had during that period planted upwards of 40 acres successfully. It consisted of a revolving disc fitted with a series of spring needles which

Fig. 2.—*Miles and Arter's Potato Planter.*



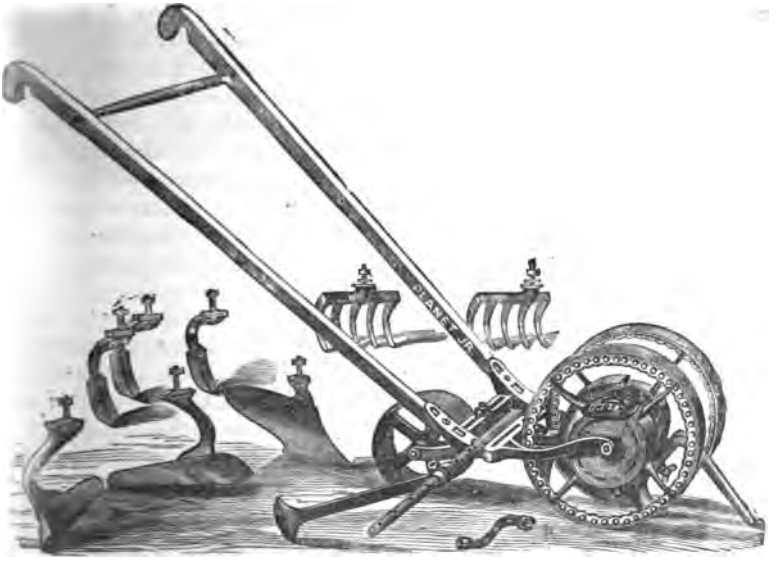
appeared to work very satisfactorily and regularly. It had evidently been thought out with much care, its special features being cheapness, accuracy of work, and simplicity. It had not before been exhibited, and was perhaps actually the most recent invention in the Show.

A new portable and collapsible hurdle was exhibited by Mr. C. F. Millar. This is made in separate parts, and can be easily put together by an ordinary labourer. The intermediate bars are nibbed, so as to keep the middle standard in place and rigid.

The ends of the intermediate bars are mortised through and shouldered against the angle iron head, the top bar being mortised and keyed through the head, the bottom bar is kept in place by an angle brace rivetted loosely on the heads, and connected by nuts and bolts to the bar; this holds all intermediate bars rigid. An improvement had been made on the original design, so that the ordinary vertical standards used for hurdles could be adopted, these being kept in place by two nibs forced upon the bar to clip the standard. The holes in the standards are punched in such a manner that the rods being pushed through and then turned round, the nibs are uppermost, being one on either side of the upright, which makes it impossible for the standard to move. To make it still more rigid, keys can be inserted on the under side if required. One great advantage of these hurdles is that they can be packed in a very small space.

On the stand of Messrs. Lloyd, Lawrence and Co., a number of small neat-looking machines were exhibited which attracted the attention of the writer of this Report, who had first noticed and examined them at the Paris Exhibition of the previous year. They are of American invention, and are distinguished by the generic, though apparently meaningless, title of "Planet, jr." They include a number of small hoes, drills, cultivators, &c., mostly adapted for hand use, but the special characteristic being

Fig. 3.—*Planet, Jr. combined Drill, Hoe, Cultivator, Rake and Plough.*



that one implement combines in itself by means of a series of adjustable attachments several distinct purposes. This can best be seen from an illustration. Fig. 3 represents a one-row drill with attachments for converting it into a hoe, a cultivator, a plough, or a rake.

The machine is shown adapted as a drill. The seed hopper, between the wheels, is perforated with a number of equidistant diamond-shaped openings; over this cylinder is accurately fitted a spring band with corresponding openings, by the adjustment of which the discharge can be regulated. The hopper holds 2½ quarts of seed, and it is claimed that the feed is equally regular whether the largest possible amount is sown or whether only a "thimbleful" is dealt with. These implements are of course mainly for garden use, but they would seem to be very well suited in many cases for allotment-holders or occupants of small holdings. At a time when the extension of *petite culture* is greatly advocated, it appears desirable to draw attention to implements which would meet the wants of farmers who have very little command of horse power.

Messrs. Stanford & Co. exhibited a Patent "Rotary" Harrow which is claimed to be especially valuable for crushing clods and pulverising the land. It consists of a wrought-iron frame, with a cast-iron bracket, with loose bearings fixed to each side, carrying two or more axles which are fitted with steel prongs and revolve as the implement is drawn forward. The frame is mounted on wheels, an arrangement which diminishes the draught as compared with a drag harrow, and allows of adjustment for harrowing the land deeper or shallower, as required. When the implement arrives at the headland it is readily lifted out of work by the movement of a lever.

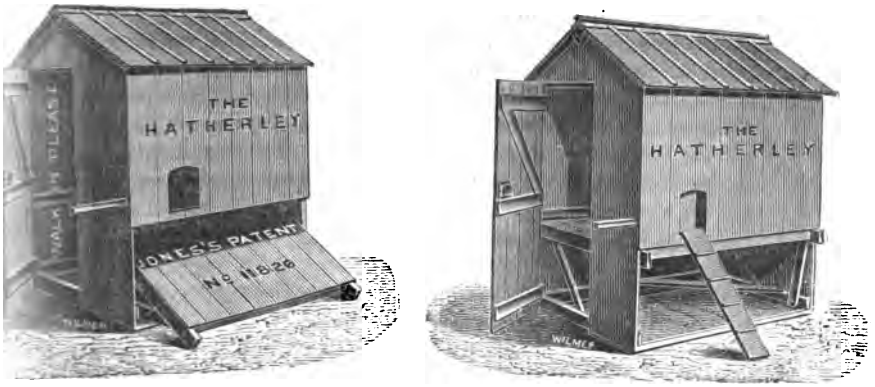
The flexible Steel Harrow invented by Mr. P. J. Parmiter appears to have won considerable favour by its simplicity of construction, durability, and effectiveness. The heavier harrows are fitted with patent renewable points. Each link is separate and the tines slip into grooves and are bolted in place, being perfectly rigid in use but easily removed and replaced when worn.

Mr. Sidney W. Gibson, a Kentish exhibitor, showed a new and improved Marking Machine specially adapted for the requirements of fruit growers and market gardeners, for marking out rows for strawberries and other plants. One of its advantages is that by its use the land can be cross marked, so that in planting out, the plant can be set at each intersection, like hop sets, a method which facilitates horse-hoeing and other cultivating operations.

A newly-patented invention was shown by Messrs. Allen,

Jones & Co. This was the "Hatherley" Fowl House, illustrations of which appear in Figs. 4 and 5.

Figs. 4 and 5.—*The "Hatherley" Fowl House.*



It will be seen that the floor is raised above the ground, but that it tips outward for facility of cleaning, being then in a sloping position. The nest boxes, four in number, are so constructed as to be readily cleaned, and are easily accessible from the door. The house seems very well adapted either for poultry-keepers in a small way, or for farmers who want moveable houses for running their poultry over the land.

Hop Appliances.

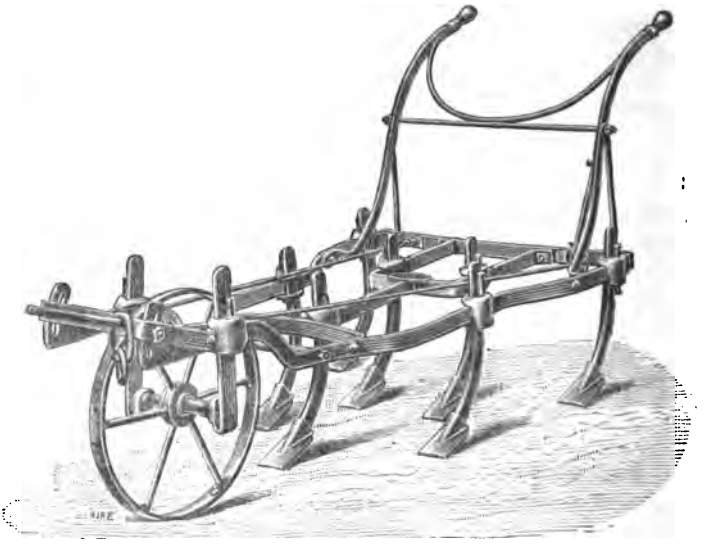
Messrs. Weeks & Co. had a complete collection of machines for hop cultivation, and among them the Hop Washing Engine which won the Silver Medal of the Royal Agricultural Society of England at the Windsor Show. It consists of an iron tank carried on a pair of iron road wheels, the axle passing through a sleeve secured inside the tank. Inside the tank are fixed a pair of inclined brass pump-barrels, the brackets are actuated through connecting rods by a double crank with throws in opposite directions, placed above the road-wheels axle. One end of the crank works in a bearing attached to the inner side of the tank, the other end passes through the side and carries a pinion which is put into gear by a clutch and lever, the hand end of which passes to the rear of the tank. The pinion is driven by a spur-wheel secured on to the axle.

The machine can be used with two, three, or four delivering pipes on each side, from each of which a stream of wash or insectide is thrown to the height of 16 feet with sufficient force to destroy the blight on the under-side of the leaves.

The attachment of the shafts to the tank is specially designed to allow of the machine turning in a very little space at the headlands. Each shaft is fixed to a strong bracket by means of a pin. When one pin is withdrawn the shafts can turn sideways on the other, the extent of motion being defined by a pair of short chains attached to the shafts and hitched on to a pair of hooks in front of the tank. At the rear of the machine is a pair of handles for working it round the end of the row.

Messrs. Jesse Ellis & Co. exhibited an Improved Hop Cultivator, fitted with their patent moveable clip tine-holder, which enables the implement to be used with either three, five, or seven

Fig. 6.—*Jesse Ellis and Co.'s Hop Cultivator.*



tines, and by means of which tines may be moved or put in any position and regulated to any depth by a blow of the hammer. Great strength and rigidity are given to the frame and it can be fitted with either square or flat tines. The cultivator is also fitted with a wheel of a new pattern, the improvement in which consists in the fact that the boxes are renewable when worn out without the necessity for replacing the whole wheel. There is also a new arrangement of "hake" or "pratt" which, while drawing from the back frame, yet allows of the draught being adjusted in the front either horizontally or vertically. The implement is fitted with Ransome's patent chilled points, made expressly for Messrs. Ellis & Co.

A new Patent Hop Washing Engine was exhibited by the Kentish Engineering Works, Limited. It is invented by Mr. R. Muirhead and is constructed on a new principle, embodying a novel application of compressed air in combination with liquid, by varying the proportions of which either "a moderately fine spray or a perfectly atomised spray," or a mixture of both, can be produced without having any small holes to choke. By this means the quantity of liquid is much economised. There is a new self-acting arrangement by means of which the liquid formerly wasted in passing from hill to hill is utilised to wash round three sides of each hill, instead of only one side. It is fitted with new pivotted elastic steel shafts, with self-acting spring releasing catch.

Mr. Balls Garrett exhibited an improved wrought-iron light Hop Sulphurator, the special recommendations of which are durability, lightness of draught, and facility for regulating the feed while in motion. The driving or fall boxes are so constructed that the fan is not suddenly stopped by the stoppage of the machine, the falls being fitted with coil springs, enabling them to revolve after the travelling wheels stop, and thus obviating the chance of breaking the gears.

A combination of a Hop Washer and a Fire Engine was shown by Mr. W. Lambert. As a hop-washer, its main feature is a simple device (which soon after the Rochester Show was improved by being made automatic) acting upon an equilibrium valve, by means of which the liquid is discharged on the poles and immediately shut off between the hills, while the pumps are charging the reservoir for the next hill. This is claimed to effect a saving of from 30 to 70 per cent. in the quantity of liquor used, but if desired the machine can be readily made to give a continuous discharge. The machine is fitted with change wheels which enable the pumps to be driven at any desired speed, thus reducing the overflow into the tank to a minimum and diminishing the draught for the horse. The liquid is discharged in a fine spray by a series of patent jets, which are readily adjustable to any position. Hose and fittings for converting the hop-washer into a fire engine are supplied if required, and the conversion can be made on the outbreak of fire in two or three minutes.

The same exhibitor had a new Hop-bine Cutter, which is designed to meet a want among hop-growers, who find it imperative to make the most of their "waste products," either for fodder, litter, or manure.

Mr. Henry S. Tett exhibited, among other hop-growing appliances, a Patent Spray Engine for hand use, which is claimed to effect a great economy in the amount of liquid used.

Messrs. Haynes Bros. exhibited an assortment of Hydronettes fitted with special jets for washing hops and fruit, and Messrs. Hayward, Tyler & Co. had several specimens of Hop Washing Engines in various sizes.

The "Strawsonizer" was exhibited by Messrs. R. Hornsby & Sons in various forms, and attracted local attention by its adaptation to the purposes of distributing wash or insecticide on hops.

Dairy Machinery.

The reference to this section of the Show can be but brief, not because of its lack of interest, but because it is elsewhere more or less directly dealt with, and this Report is already tending to exceed its allotted space.

The most interesting machines were as usual shown in operation at the Working Dairy, and any reference to them therefore will come more appropriately under that heading. The Cream Separators of the Dairy Supply Company, of Messrs. Freeth and Pocock, and of Messrs. R. A. Lister and Co., were there exhibited in motion, though specimens were also to be found on the respective stands of these exhibitors. The Dairy Supply Company had also an extensive collection of the various appliances with which their name is now widely associated, including the famous "Delaiteuse." This firm has brought out a new preparation, suggestively named "Jack Frost," for preserving cream, an essential commodity in these days of "potted" cream. This is merely cited as a succinct indication of the fact that the Dairy Supply Company are, as usual, "up to date."

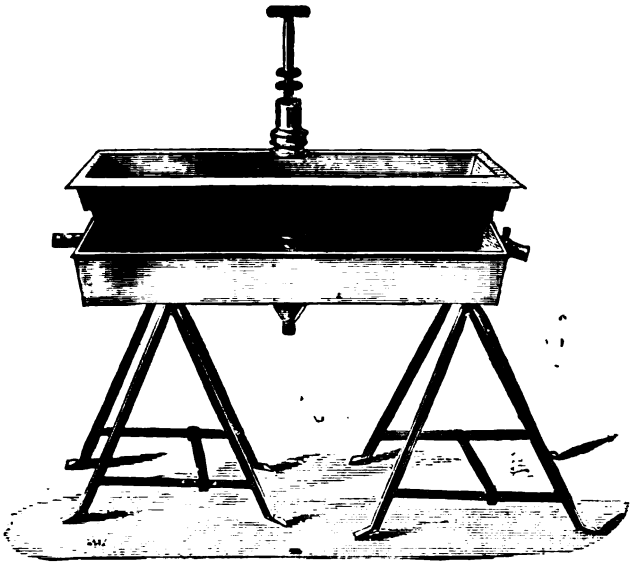
Messrs. Freeth and Pocock also had a large assortment of every description of dairy requisites. One of their latest appliances is a milk-scale and elevator combined, which weighs the milk in the churn, automatically prints the weight on a ticket, and elevates and tips the milk into the separator tub. They also had a new egg-box for sending eggs by parcel post, in which each egg is separately encased in felt.

Mr. W. Snaydon exhibited a new Creamer, called the "A. B. C." (Fig. 7.) It is constructed on the same principle as the Jersey and Dorset creamers, viz., that of a jacketed pan. The outlet for the milk and cream is in the centre of the bottom of the pan, and each creamer rests on a pair of adjustable iron trestles, so constructed that the legs will expand or contract by a simple arrangement so as to enable it to stand level on an uneven floor.

The Aylesbury Dairy Company exhibited the Danish cream separator in sizes for both steam and hand power.

Messrs. T. Bradford and Co. had a large assortment of their

Fig. 7.—*The "A. B. C." Creamer.*



famous churns, butter-workers, and other dairy appliances, but they reserved their novelties for the Plymouth Show. Among other noteworthy exhibits in this section it must suffice to mention the world-renowned churns of Mr. Hathaway, the well-known milk-churns of Messrs. Alway and Sons, the widely-used churns and butter-workers of Messrs. G. Llewellin and Sons, the celebrated churns of Messrs. W. Waide and Sons, the complete cheese and butter-making plant of Messrs. Pond and Son, and the Jersey Creamers of the Jersey Company.

Miscellaneous.

There is always a certain "fringe" to the Implement department, comprising a number of articles which may be said to come rather within the sphere of "manufactures" than of "agriculture." Often some of the most ingenious inventions in the Showyard are to be found among the extra-agricultural exhibits, and though little space can here be devoted to them, a word must be said of one or two. A good deal of interest was excited in a plate-and-dish-washing machine, manufactured by Messrs. G. W. B. Crees and Co., and exhibited by Mr. J. W. Titt. This consisted of a series of revolving brushes working by means of crank and hand gear in a trough of water. The plates were merely inserted between the brushes, and after a few turns

were gently ejected into a tub of water at the end of the trough. The simplicity and ingenuity of the machine aroused general admiration.

Mr. H. Olsen exhibited some specimens of machine-spun straw ropes, which seem to have met with considerable favour among Scotch farmers, and which are likely also to become popular on this side of the Tweed. They are supplied at a cost which must be below that at which sheaves can be bound in the ordinary way, when the wastefulness of this course is taken into account, while for thatching purposes their advantages are even more obvious.

An apparatus, by which every householder might be his own chimney-sweep, was exhibited by Mr. C. R. Valentine. It consisted of an endless chain to be run over a pulley at the top of the chimney, with an attachable metal brush.

THE WORKING DAIRY.

THE building erected as a Dairy at Rochester covered a ground-space of 100 ft. by 90 ft., and was the largest yet erected for the purpose at any of the Society's Shows. This continued extension is practically necessitated by the remarkably numerous entries in the competitions for butter-makers year after year. When it is necessary to provide sufficient accommodation for some thirty competitors at one time with their churns and butter-workers, it is evident that considerable floor space is required.

The building was substantially erected, and, being painted white throughout, had an attractive and business-like appearance. The deeply-thatched roof, with its low eaves, added very much both to the coolness and to the picturesqueness of the structure. The large amount of straw required for the thatch was kindly supplied by Mr. J. Ord Moore, the Mayor of Rochester. In the internal arrangements several improvements in small details were noticeable, which spoke of the watchful eye of the Steward.

The daily programme of operations arranged for the opening of the Dairy for the inspection of appliances at 9 o'clock. At 10 the power cream separators were worked; at 10.30 the processes of Devonshire cream and butter-making were illustrated; at 11 Miss Davey, Miss Barron, and Professor Carrol gave demonstrations and explanations of the practice of butter-making; at 12.30 there was a lecture; at 1.15 the hand-separators were worked; and at 2 there was a butter-making competition, which lasted all the afternoon.

Equipment.

The equipment of the Dairy was selected so as to show all he most improved appliances without too much duplication. No competition for separators was arranged as in the previous ear, but all the three machines which took part in the Exeter rial were exhibited and worked. The "Laval" separator of he Dairy Supply Company has now, after more than a decade f practical working in this country, so established a reputation hat it scarcely needs more than mention. It is now made in arious sizes, from the "Baby," which will separate 15 gallons er hour, to the "Reading Royal," which will separate 150 allons per hour. The new machine, called the "Windsor," r hand power—capable of separating 35 gallons per hour—naturally aroused chief interest at Rochester. The other size hown was the "A 1," capable of separating 90 gallons per our. Both machines did excellent work.

Messrs. Freeth & Pocock exhibited their "Victoria" separator n two sizes, for power and hand respectively. The former was apable of separating 75 gallons per hour, and the latter of parating 20 gallons per hour. Messrs. Freeth & Pocock claim o have been the first in the field in this country with a hand

Fig. 8.—"*Alexandra*" *Hand Separator.*

separator. There is not much to add to the full particulars of these machines, which appeared in the last volume of the 'Journal,' though improvements in minor details continue to be made.

Messrs. R. A. Lister & Co., in addition to their "Alexandra" power separator, which so favourably impressed the judges at the Exeter trials, also exhibited a new hand separator, which they had lately brought out, and which is illustrated in Fig 8.

The hand separator is constructed on the same principles as the power separator of the same firm. The advantage of the loose drum, which is the characteristic of the "Alexandra" machines, is very evident in diminishing friction, and rendering the machine easy of working. It is a very handy and simple machine, and has already won wide popularity.

Messrs. Lister now supply a complete cream-separating plant, which is so well arranged as to be easily under the control of one attendant. One of the latest additions to the set of machinery is a milk pump, which receives the milk as it runs from the separator, and raises it to the milk scalder. This is a neat and well-made appliance, and one which, where power is used in the dairy, is likely to find favour. It was shown in operation in the Working Dairy.

The power for driving the separators was provided as usual by one of Mr. E. S. Hindley's six-horse power vertical engines, which are specially adapted for such work.

It is scarcely needful to refer to all the various appliances which went to make up the equipment of the Dairy. The new A. B. C. creamer (referred to on p. 32) was exhibited. There was also a very complete plant for Devonshire cream-making, kindly supplied by Messrs. Damerell & Sons, of Exeter, which was used each day by Miss Winter, of Chedzoy, Bridgwater, for demonstrating the process.

Competitions.

The competitions for butter-makers aroused a very large amount of public interest. The number of spectators every day was very large, and the progress of each competition was watched with the keenest attention. It might not unnaturally have been anticipated that the number of competitors would not be so large at Rochester as it was, in the heart of a dairy district, at Exeter. But the ardour of competitors was proof against any difficulties of access, and there were 116 entries—an unprecedented number—as against 92 at Exeter in 1889, and 58 at Newport, in 1888. The following 15 counties were represented in the competitions—Beds, Bucks, Dorset, Essex,

Glamorgan, Gloucester, Middlesex, Oxon, Pembroke, Somerset, Suffolk, Surrey, Sussex, Warwick, Yorkshire. It was curious that not a single competitor came from the county in which the Show was held.

The arrangements for the competitions were similar to those of previous years, each competitor being supplied with a churn, butter-worker, and necessary appliances. The cream was well mixed and stirred before being given out, and one quart was served out to each churn consecutively, so as to secure evenness of quality for all, and each lot was also weighed so as to secure uniformity of quantity. There was, however, a slight difference in the quality as well as in the quantity of cream served out on one day as compared with another, so that the results recorded in one class are not fairly comparable with those of another.

On the first day of the Show four prizes were offered for "the best and largest quantity of butter made from a given quantity of cream, in the cleanest and most approved style," the competition being limited to persons who had attended a course of instruction at one of the Society's Dairy schools. The quantity of cream given to each competitor was 15 lbs. There were nineteen competitors present, and the results and details were as follow:—

Award.	Competitor.	Temperature of Churning.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
1st.	Mr. L. Classey	57	48	6	7
2nd.	Miss A. W. Rutherford ..	58	52	6	4¾
3rd.	Miss A. Evans	56	65	6	6
4th.	Miss E. Wright	56	50	6	5¼
R. & V.H.C.	Miss L. Sherborne	56	65	6	6¼
H. C.	Miss A. M. Lenthall	57	57	6	6¼
	Miss M. A. Marsh	56	56	6	5
	Miss E. M. Nevell	59	40	6	5
	Mrs. E. Nevell	59	36	6	4¾
C.	Mrs. S. Crook..	56	49	6	2½
	Mr. E. W. Tatler	58	42	6	7¼
	Miss A. A. Walker	58	51	6	5
	Miss F. L. Weaver	56	39	6	5
	Averages	57	50	6	4½

It will be observed that there was only a margin of 4¾ ounces between the largest and the smallest quantity of butter made.

On the second day of the Show the competition was limited to females, but without other restriction. Out of twenty-seven competitors who took part, however, eighteen had passed through the Society's Dairy Schools. The amount of cream given was 9 lbs., and the following were the results:—

Award.	Competitor.	Temperature of Churning.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
1st.	Miss J. Wells	58	43	3	14
2nd.	Miss F. L. Weaver	56	..	4	0
3rd.	Miss R. Sherborne	..	53	4	1¾
4th.	Miss A. A. Weaver	56	31	3	13½
R. & V.H.C.	Miss A. Roberts	58	..	4	0¼
V. H. C.	Miss A Williams	..	53	3	1¼
H. C.	Miss M. Brown	56	..	3	13½
	Mrs. S. Crook	56	..	3	14¼
	Miss A. M. Lenthall	56	44	3	14¾
	Miss E. M. Nevell	56	32	3	13
	Mrs. Brown	58	..	3	15
C.	Miss Mary Lewis	53	43	3	14½
	Mrs. E. Walker	58	32	3	14¾
	Averages	..	..	3	13¾

The competition on the third day of the Show was open to all comers (male or female), except the first-prize winner in the previous class, and twenty-eight competitors took part. The quantity of cream allotted was 9 lbs., and the results were as follows :—

Award.	Competitor.	Temperature of Churning.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
1st.	Miss A. Williams	56	60	3	9¼
2nd.	Mr. L. Classey	56	75	3	10¼
3rd.	Miss A. Roberts	56	57	3	9
4th.	Miss Mary Lewis	54	50	3	8½
R. & V.H.C.	Miss F. L. Weaver	54	47	3	9¾
H. C.	Miss M. Brown	56	33	3	6¼
	Miss A. Haddon	53	57	3	10¾
	Miss A. M. Lenthall	56	52	3	9¼
	Miss L. Sherborne	54	43	3	9¾
	Miss A. A. Walker	56	55	3	9
	Miss A. A. Weaver	54	56	3	8½
	Miss E. Wright	56	47	3	9½
	Mrs. Brown	59	42	3	9¼
	Miss R. Sherborne	57	56	3	10
	Miss Evans	54	55	3	10½
C.	Miss H. M. Joseph	55	52	3	10¼
	Miss M. A. Marsh	55	45	3	8
	Miss E. M. Nevell	56	57	3	8
	Mrs. E. Nevell	54	57	3	9¼
	Miss E. M. Bird	55	34	3	10¾
	Miss A Carter	58	42	3	10¼
	Miss C. Dumbrell	58	50	3	9½
	Miss E. E. Fritchley	56	32	3	8¼
	Mrs. E. Walker	58	43	3	9
	Miss J. Wells	54	58	3	8¼
	Averages	56	50	3	9

The range of weights here again over twenty-eight distinct churnings was very small, the difference between the greatest and the least quantity of butter being only 4 oz.

The competition on the fourth day was again an open one, the only persons debarred from entering being the winners of first prizes on the two previous days. There were twenty-nine competitors, and the quantity of cream allotted to each was 9 lbs. Results:—

Awards.	Competitor.	Temperature of Churning.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
Equal 1st.	Miss H. M. Joseph	57	50	3	4¼
	Mr. L. Classey	57	..	3	1¼
3rd.	Miss M. A. Marsh	55	..	3	3¼
4th.	Miss A. Roberts	56	36	3	3
R. & V.H.C.	Miss Evans	56	39	3	4
H. C.	Miss M. Brown	56	..	3	0
	Miss L. Sherborne	54	..	3	7
	Miss F. L. Weaver	53	48	3	5¼
	Miss E. Wright	58	47	3	1¼
	Miss E. M. Bird	54	36	3	5¼
	Mrs. Brown	55	32	3	3¼
	Miss R. Sherborne	58	45	3	4¼
	Mrs. E. Walker	58	..	3	3¼
	Miss J. Wells	58	45	3	2
C.	Miss A. A. Walker	55	45	3	2¼
	Miss A. A. Weaver	54	46	3	3¼
	Miss Mary Lewis	58	35	3	0¼
	Mr. J. S. Latham	57	60	3	3
	Mr. J. Walker	58	42	3	2¾
	Averages	56	..	3	3¼

On the last day of the Show a "Champion" contest was arranged, in which only the winners of prizes in the previous competitions were eligible to compete. There were three prizes offered—a gold, silver, and bronze medal respectively, and the Society's certificate was also given to each of the "Medallists." There were eleven competitors, and the quantity of cream allotted to each was 7 lbs. The results and particulars are given in the first table on page 40.

This was the first time in the record of these competitions that the Championship had been carried off by a man.

A "Consolation" class was also arranged for those who had not won a prize in any of the classes, and the competition took place simultaneously with the Championship contest. There were fifteen competitors, and money prizes ranging in value from 25*s*. for the first prize to 5*s*. for the fifth prize were given.

Award.	Competitor for Championship.	Temperature of Churn.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
Gold Medal.	Mr. L. Classey	57	36	2	0
Silver Medal.	Mrs. Williams	56	51	2	3½
Bronze Medal.	Miss A. A. Weaver ..	56	44	2	0½
R. & H. C.	Miss Evans	56	38	2	2½
H. C.	Miss H. M. Joseph ..	57	46	2	2½
	Miss M. A. Marsh	55	41	2	2½
	Miss F. L. Weaver ..	54	45	2	5¾
	Miss E. Wright	56	43	2	2½
	Miss Mary Lewis	58	40	2	0¼
	Miss A. Roberts	56	39	2	0
	Miss R. Sherborne	57	46	2	2¼
	Averages	56	43	2	2

The details of the "Consolation" competition are as follows, the quantity of cream given being 6 lbs. :—

Award.	Competitor.	Temperature of Churning.	Time of Churning.	Weight of Butter.	
		Deg. Fah.	min.	lbs.	oz.
1st.	Mrs. E. Walker	56	35	1	13½
2nd.	Miss M. Brown	56	30	1	12½
3rd.	Miss A. Haddon	58	28	1	13
	Miss L. Sherborne	57	32	1	15½
4th.	Mrs. E. Nevell	56	29	1	12
	Mr. E. W. Tatler	55	33	1	14½
	Miss A. A. Walker	56	30	1	12¾
	Miss A. Carter	58	47	1	13
	Miss A. M. Lenthall	56	32	1	13
5th.	Miss E. M. Nevell	55	36	1	13¾
	Miss E. M. Bird	54	52	1	14½
	Mrs. Brown	58	47	1	13½
	Miss C. Dumbrell	58	51	1	14½
	Miss E. E. Fritchley	56	30	1	11½
	Miss J. Wells	56	49	1	11½
	Averages	56	37	1	13

It is worthy of note that of the sixteen prizes and three medals offered (exclusive of the "Consolation" class) eleven prizes and two medals were won by students who had been instructed in one of the Society's Dairy Schools. The churns used in the competitions were those of Messrs. Bradford and Co., G. Hathaway, and Llewellin and Sons, and the butter-workers were all of Messrs. Llewellin's make.

A great boon to competitors and others engaged in the Dairy was the institution of a tea-tent. This innovation, which was

due to the Dairy Steward, was greatly appreciated by all for whom it was intended. The tent adjoined the Dairy, and tea and bread-and-butter were provided there every afternoon for the benefit of the workers.

Dairy Test Competitions.

The Society offered two Gold Medals—one for the best appliance for determining the amount of butter-fat in milk, and the other for the best appliance for testing the acidity in milk. The competition, however, was somewhat disappointing, only three competitors entering in the first-named class and two in the second. They were Mr. A. W. Stokes, Mr. C. R. Valentine, and the Dairy Supply Company.

The methods were subjected to an exhaustive, practical, and scientific examination, and this resulted in the Judges' reporting that, although there was considerable merit and ingenuity displayed, no exhibit in either class fulfilled the requirements sufficiently to be entitled to the Prize.

Four Lectures were delivered in the Dairy, two by Mr. Bernard Dyer, F.C.S., and two by Mr. F. J. Lloyd, F.C.S. The subjects treated by the former were "Milk and Butter Taints: How Caused and How Avoided," and "The Causes of Ripening and Flavour in Cheese, and their Control." Mr. Lloyd's subjects were "The Feeding of Dairy Cattle for Butter," and "The Feeding of Dairy Cattle for Cheese." A summary of these Lectures will be found among the articles in this volume.

SUNDAY SERVICE IN THE YARD.

The service on the Sunday of the Show week was held in the Dairy, the sermon being preached by the Dean of Rochester (Dr. Hole) from the words, "He passed through the corn-fields on the Sabbath day." The service was conducted by the Rev. H. Witherby, M.A., Vicar of St. Peter's, Rochester, in which parish the Showyard was situated, and a contingent of choristers, together with the band of the Royal Engineers, assisted in the musical part of the service. There was a very large congregation, most of the Stewards and other officials of the Society being present, together with the herdsmen in charge of the Stock and others engaged in the Yard.

III.—*Report on the Exhibition of Hops at Rochester.* By CHARLES WHITEHEAD, F.L.S. (Steward).

IT was only decided by the Rochester and Chatham Local Committee to offer prizes for hops after the hop-picking of 1889, and when many of the growths had been sold, so that the planters in these cases could not make entries for this competition. And with respect to growths on offer, arrangements had to be made with the purchasers to allow a pocket to be reserved for exhibition.

For this reason the number of entries was very limited, although the prizes offered by the Local Committee were liberal, and Messrs. Le May gave a piece of plate worth 26*l.* 5*s.* as a Champion Prize.

As the crop of 1889 was of fairly good quality, there would have been as good a show of hops at Rochester, it is thought, as at Maidstone in 1884, had the announcement of this competition been made before the hop-picking season. But in the circumstances there were only 12 entries, against 47 at Maidstone, the largest show of hops ever held in this country, except that of Windsor at the Royal Agricultural Society's Show in 1889, where there were 54 entries.

The prize list for hops at Rochester is given below :—

	First Prize.		Second Prize.	
	£	s.	£	s.
Pocket of East Kent Hops	10	0	5	0
Pocket of Mid-Kent Hops..	10	0	5	0
Pocket of Weald of Kent Hops	10	0	5	0
Best Pocket of Hops in any of the Classes	20	0	..	
Champion Prize (Messrs. Le May's)	26	5	..	

In the First Class, East Kent Hops, there were only 2 entries. The Judge had not much difficulty in deciding which of these should stand first, as Mr. E. Leney's sample (741) was as good a specimen of East Kents as could be seen. It was beautifully managed, of a brilliant colour, and superfine quality. Many good judges of hops said they had hardly ever seen such a perfect sample. The other entry was deemed worthy of the second prize.

For the prizes for Mid-Kent Hops there were 6 entries. The first prize was awarded to Mr. Lionel Fletcher for 744, a thick, rich, well-turned-out sample, of fair colour. Mr. Fletcher took the first prize for Mid-Kent Hops at the Bath and West of England Show at Maidstone in 1884. The second-prize sample,

745, shown by Mr. Herbert Leney, was very good, but not of such fine, even quality as No. 744. The entries 743 and 746 were useful hops. One of the other samples had been badly kept, and showed much crust.

Only three samples competed in the Weald of Kent Class. The first prize was given at once to the splendid sample shown by Mr. R. H. Bowman, of the Grange, Hadlow, as to which the Judge declared he had never seen a sample better grown, and better managed. Grown on the borders of Mid-Kent, it had many of the attributes of Mid-Kent hops, and was simply perfection in point of colour, richness, management, and aroma given off in the "rub-down."

In the competition for the prize of 20*l.*, offered by the Local Committee for the best sample in any of the above Classes, the Judge, Mr. Norwood, whose knowledge of hops is known to be supreme, had a somewhat difficult task. On the one hand there was the fine sample of East Kents, and the extraordinarily fine sample of Weald of Kents. There was no doubt that the latter was better grown, better managed, and better coloured than the former, but the Judge also had to take into consideration the actual value of the respective samples from the brewers' point of view, and this naturally turned the scale in favour of the East Kent entry.

The same happened in the competition for Messrs. Le May's Prize, for which the entries were the same as for the Champion Prize, except that a planter at Farnham had entered a pocket, as the competition was without restriction to any particular county. The issue, however, was, as before, between the East Kent and the Weald of Kent samples, and the Judge could do no other than award this prize to the entry of Mr. Leney, who thus carried off 30*l.* in money, and the clock worth twenty-five guineas.

Much interest was taken in the Hop Exhibition, though it was so small. It is most unfortunate that notice of the competition was not given earlier, as it is highly important that every stimulus should be given to English planters to grow their hops well, and to manage them well, as the American planters are straining every nerve to produce hops that may be able to compete successfully with the best British brands.

IV.—*Report on the Preserved-Fruit Exhibition at Rochester.* By CHARLES WHITEHEAD, F.L.S. (Steward).

KENT is admittedly the fruit garden of Great Britain. More fruit is produced within its borders than in any other county, and the quality of its fruit cannot be surpassed. Yet there was only one entry in the four classes, in which an aggregate sum of 20*l.* was offered for Preserved Fruit of various kinds, and that solitary entry did not come from Kent, but from Liverpool. These prizes for preserved fruits were offered by the Council to encourage the manufacture of jams and preserved fruits of all kinds, whose consumption is enormously increasing in this country.

Universal astonishment was expressed by the visitors to the Show at this *fiasco* in a district surrounded with such fine orchards and splendid fruit plantations. Many sought to discover the reason, but without any satisfactory result, and it remains an enigma.

The one entry of jam proved to be of fair quality, and its spirited owner, Mr. J. Tranton, Cheapside, Liverpool, duly received the first prize of 3*l.*

Fruit-Packing Appliances.

The same apathy characterized the competition in the Two Classes for Fruit-packing Appliances.

Mr. H. A. Brassey was the only exhibitor in each class, and received the first prize of 3*l.* for very serviceable packages.

At this time, when fruit culture is increasing so rapidly, and it is most important in the interests of producers, and eminently of consumers, that means of distribution should be facilitated in every possible way, it is very disheartening to the Council of the Society to find their efforts to encourage the development of suitable packing appliances are unavailing.

V.—*Supplementary Report on the Dairy Department of the Rochester Exhibition.* By Professor CARROLL.

THE judging of dairy produce at Agricultural Exhibitions is at all times a matter of difficulty. This difficulty does not decrease, and at Rochester the Judges must have been extremely perplexed in discriminating between the various exhibits of cheese, butter and cream. Fortunately for my peace of mind, I was relieved from the duty of assisting in adjudicating the prizes

in these sections of the Dairy Department; but I could not resist the temptation to visit the Dairy-produce tent for the purpose of seeing what progress was being made towards that perfection which previous exhibitions foretold, and, having done so, must express my great satisfaction with what I noticed.

In the Fresh Butter Classes there were forty-three entries, and it was difficult to find a really inferior sample of butter among them. This is very satisfactory, seeing that the exhibitors live in districts widely apart, from each of which, it is to be hoped, improvements will radiate.

The Salted Butter Class was a small one, and the quality of the exhibits as a whole was not equal to that in the fresh butter classes. This is the less to be regretted, as the markets for preserved butter are yearly becoming more restricted, and, owing to the large area of Europe in which dairying is now carried on, the necessity for making butter for long keeping is diminished. I feel more convinced each year that the introduction of a system of winter dairying in many districts in England would be attended with advantage, and, with an extension of this in Scotland as well, the making of butter for "keeping" purposes would be completely extinguished.

The number of exhibitors in the Cheese Section was not as large as one would wish, but this must have been expected, inasmuch as the site of the Show was a long way removed from cheese-making centres. The exhibitions of cheese appear to be generally resorted to by the same exhibitors year after year, and this is somewhat deterring to makers whose systems of manufacture are not productive of first-class results. If the Society is as successful in its cheese-making schools as it has been in the schools devoted to instruction in butter-making, we may expect to find a large increase of exhibitors in the Cheese Classes at future Shows.

The Classes for Dairy Appliances were devoted to encouraging the production of simple scientific apparatus for dairy purposes. The Society does well by thus endeavouring to bring practice and science into a closer relationship, and the time will come when practical farmers will be more disposed to avail themselves of the teachings of science than is the case at present; but it will be judicious to move slowly in the direction of bringing them into the position of analytical chemists. What would appear to be the best course for our Societies would be to encourage those engaged in the cultivation of land to make greater use of those whose business is the dealing with agriculture scientifically, and to cheapen, as far as is consistent with efficiency, the services of such experts.

Of all the products of the farm, milk is one of the most

difficult to examine in a thoroughly satisfactory manner. This is well known to those who have even a small amount of chemical knowledge. This being so, great care should be exercised in placing before persons unaccustomed to delicate examinations means for rough-and-ready investigations. Scientific examinations must be exact, and without this exactness they may be useless or even mischievous.

It was with feelings such as these that I entered upon the duty of considering the claims of competitors in the classes for appliances for determining the amount of butter-fat in milk, and for testing the acidity of milk for the purposes of cheese-making. I had the good fortune to be associated with Messrs. Voelcker and Dyer in adjudicating here, and, after an extremely careful scrutiny of the exhibits, we arrived at the results embodied in our Report.

The Working Dairy, which now has taken almost the premier place at the Exhibitions of the Society, was "better than ever." Indeed, it would be difficult to see where improvement could take place either in the construction of the Dairy or in its arrangements. If precision, punctuality, and absence of hitches are evidence of good organization, then it may be said that the Working Dairy at Rochester was perfect in this respect. At the times appointed the work commenced with faultless regularity, and, considering the very large number of competitors in the butter-making contests, it could not have been an easy task for the Steward and his assistants to make arrangements for their working. The interest which the competitors take is only equalled by the eagerness with which the visitors to the Show come to witness the competitions, which latter are now so popular that thorough organisation is absolutely necessary to prevent their becoming unwieldy. Each competition that I witness makes it more evident that they have a useful educational character, both for those who take part in them as well as for those who are looking on. It is pleasant to record the difficulty with which the Judges came to conclusions in making awards. Doubtless the onlookers were very impatient whilst Mr. Rigby and myself were puzzling over the claims of different competitors, and no doubt many who witnessed our perplexity thought what stupid fellows we were in not coming to conclusions sooner.

The expositions of butter-making and explanations by Miss Davey and Miss Barron were much appreciated. These young ladies deserve no little credit for the energy and ability they display in promulgating correct information with regard to this most important department of dairy practice. Always ready to answer questions, they were often fully occupied in replying to the inquiries of persons desirous of information.

Miss Winter gave illustrations of the making of Devonshire cream and butter, and there was a large amount of interest taken in her demonstrations. Whilst butter-making upon "Devonshire" principles may be fast dying out, there will undoubtedly be a long future for well-made Devonshire cream, and there was evidence that the particulars of its manufacture given by Miss Winter were much appreciated.

In conclusion, I may say that I fully believe that the Dairy Department of the Show at Rochester was extremely useful as an educational medium, and that the Society may rest assured that it has kept its position as being foremost in the rank of institutions promoting the welfare of the agricultural classes.

Original Articles.

VI.—*In Memoriam.* By Thos. F. Plowman.

Since the issue of the last volume of the 'Journal,' one who had long and honourably served the Society has been removed by the hand of death. On June 3rd last, upon the eve of the Rochester Meeting, Mr. Josiah Goodwin passed away, after having edited the Society's 'Journal' for more than thirty years, and having acted as Secretary also during a considerable portion of that time.

Mr. Goodwin, who was the son of the Rev. Josiah Goodwin, a Wesleyan minister, was born at Scarborough on December 29, 1817. Early in life he attached himself to journalism, and soon showed a special aptitude for his vocation. He was an exceedingly expert shorthand writer, and his intelligence and accuracy as a note-taker led to his being engaged to furnish official reports of many important arbitration cases in London and the Midlands arising out of the first development of railway enterprise. He subsequently obtained a wide experience of press work generally, and the 'Birmingham Advertiser,' the 'Wilts County Mirror,' and the 'Exeter Gazette' all came under his editorship.

In 1859, Mr. Goodwin first became connected with the Bath and West of England Society, having been appointed Editor of its 'Journal,' and, on the retirement of the late Mr. H. St. J. Maule, in 1866, he succeeded him as Secretary, holding the two offices conjointly. During his tenure of the last-named office the Society's area of usefulness was much extended, and there were new and important developments in its operations. In 1868, he added to his responsibilities by taking temporary charge of the 'Journal of the Royal Agricultural Society of England,' and he brought out two of its numbers during the interregnum which occurred between the death of Mr. Frere and the appointment of a new Editor, the late Mr. H. M. Jenkins.

After some years of arduous secretarial work, Mr. Goodwin unfortunately contracted a chill which resulted in an attack of acute rheumatism that permanently disabled him. In conse-

quence of this, he resigned his Secretaryship in 1882, but retained, at the wish of the Council, the post of Editor. He carried with him, on his partial retirement, the esteem and good-wishes of those whom he had so faithfully served, as the following extract from the official report of the proceedings of the Council, held on November 28, 1882, testifies:—

"Sir John Duckworth, Bart., said that he should consider the business of the day incomplete without some allusion to the loss which the Council were about to sustain by the retirement of Mr. Goodwin from the Secretaryship. The zeal and devotion which had been displayed by him from the commencement of his connection with the Society could not fail to meet with the hearty appreciation of the Council. Of his general ability, and the readiness which he had always shown to assist or advise every member of the Council, not restricting his attention to the bare performance of his duties, it was unnecessary to speak, and, while expressing a hope that in the important office, as Editor of the 'Journal,' which he still retained, the Society might for many years to come have the benefit of his services, he (Sir John) begged to move the following resolution:—

"'That the Council cannot refrain, on the election of a new Secretary, from recording their sincere acknowledgment of the great zeal and ability with which the duties of the office have been discharged for many years by Mr. Goodwin, and their earnest wishes for his improved health and his success in the engagement which he still undertakes.'

"Mr. J. C. Moore-Stevens, as an old friend of Mr. Goodwin, had much pleasure in seconding the resolution, and alluding to his ability, referred to the time when the Council of the Royal Agricultural Society, being for a while in a dilemma owing to the death of Mr. Frere, were glad to enlist the aid of Mr. Goodwin in editing their 'Journal.'

"Mr. Acland, M.P., said that the interest felt by his father, Sir T. D. Acland, in the affairs of the Society was known to all present, and it was only indisposition which prevented him from attending so important a meeting. He hoped, however, he might be allowed, on behalf of Sir Thomas, to bear his warm testimony to the great value which, as Chairman of the 'Journal' and Arts Committees, he had always attached to the never-failing industry, courtesy, and discretion of Mr. Goodwin, not only in all the various matters connected with the annual Shows, but in every department of the Society's operations. Sir Thomas desired to express his gratification that Mr. Goodwin's connection with the Society was not to be severed, but that, as Editor of the 'Journal,' they would still have the advantage of that experience and knowledge of the Society's past history which were so invaluable.

"The resolution having been carried by acclamation, the President (Lord Brooke), in conveying to Mr. Goodwin the feeling and vote of the Council, remarked that during the short time of his association with the Society he had been greatly assisted by the courtesy of the Secretary, and he could not fail to realise, as all the Council did, that in Mr. Goodwin's retirement they would suffer considerable loss."

Mr. Goodwin combined with a sound judgment and a cultivated taste other qualifications peculiarly fitting him for the duties of editorship. He had a mind exceptionally well-stored with information on a multiplicity of subjects, whilst a singularly retentive memory enabled him to recall and utilise the

varied experiences of a busy life. The 'Journal' increased in interest and usefulness under his charge, and, though his physical health gradually declined, he retained his mental vigour. During the last few years of his life, when his sufferings were frequent and acute, his resolution and his patience must have been severely taxed for the discharge of the duties devolving upon him. There was, however, no falling off observable in his work, and it was generally admitted that his editorial capacity was shown to the fullest advantage in the last volume of the 'Journal' for which he was responsible. Its production was a final effort, for from the time it left his hands his strength rapidly failed, and it became evident that his life's work was all but finished. At intervals the spirit asserted itself, and gave hope that there might be some reserve of strength yet to be drawn upon, but these were but temporary rallies of exhausted nature, and unconsciousness gradually set in. At the last the summons came in all peacefulness, and in the calm of sleep.

In Bath, Mr. Goodwin has claims upon remembrance outside the sphere of the Society he represented. On taking up his residence in the city he identified himself with its literary life, and rendered good service in an honorary capacity to some of its public institutions, including the Royal Literary and Scientific Institution, the Literary and Philosophical Association, the Bath Centre of the Oxford Local Examinations, and the Weymouth House Schools, all of which had the advantage of his services as Secretary.

He took a keen interest in antiquarian pursuits, and in recognition of his labours in this direction, was elected a Fellow of the Society of Antiquaries.

During the latter years of his life the conditions of his health kept him very much secluded from the world, but he nevertheless maintained a healthy and cheery interest in passing events. His conversational powers afforded much pleasure to those who enjoyed his friendship, for his career had furnished him with many entertaining and instructive reminiscences, the interest of which was enhanced by the telling. He had not only seen much of men and things under many different aspects, but his memory could be relied upon to honour the drafts he drew upon it. He had at all times a certain stateliness of speech and a carefulness of expression suggestive of a period when life was less of a whirl and rush than now, and when men took time to weigh their words before they uttered them. His genial courtesy—which was so natural to him—and kindly consideration for the feelings of others, rendered intercourse with him a pleasant experience at all times, as those who were brought into

personal contact with him, and especially his colleagues, could testify.

It was in accordance with Mr. Goodwin's retiring and unassuming nature, and with the modest estimate he had of his own work, that he should have left behind him no materials which could help to furnish a fitting record of his life. To this is attributable the incompleteness—of which the writer is keenly sensible—of this brief tribute to his memory.

At the first meeting of Council after Mr. Goodwin's death, the following resolution was moved by Mr. Story-Maskelyne, M.P., and seconded by Mr. Murch:—

"That the Council of the Bath and West of England and Southern Counties Society desire to place on record their deep sense of the loss the Society has sustained by the death of their late Editor, Mr. Josiah Goodwin, and their appreciation of the zeal and ability which marked his long connection with the Society. They also desire to convey to his family their sincere sympathy with them in their bereavement."

This was supported by Mr. Acland, M.P., and Mr. Moore-Stevens, and carried unanimously.

On the motion of Capt. Best, seconded by Mr. C. R. Collins, and supported by Sir T. D. Acland, the Council further recognised the services, so long and ably rendered by the Society's late Editor, by voting an honorarium of 200*l.* to his widow.

VII.—*Heredity: Its Influence on the Animals of the Farm in Health and Disease.* By Professor G. T. BROWN, C.B.

IT is the custom to look upon the breeding of pedigree stock as an outcome of the system of high farming which has arisen within the present century, and no one would be inclined to underrate the progress of the breeder's art during the last fifty years. But all the credit must not be given to the moderns. Mr. Darwin, in his work 'On Animals and Plants in Domestication,' has proved, beyond all question, that the ancients knew as well as we know the influence of heredity, and acted, as we act, on the maxim—not for them defined in so many words—"like produces like." Youatt, one of our early veterinary writers, also refers to passages in the Old Testament which relate to breeding, and remarks that "at this early period some of the best principles of breeding must have been steadily and long pursued."

Classical writers speak of the care and judgment exercised by

the ancients in the selection of mares and stallions; in the importation of cattle of special excellence to improve native breeds; and quote the remarkable and suggestive example of King Pyrrhus, who had a specially valuable breed of oxen, the bulls and cows of which he did not suffer to come together until they were four years old, in order that the breed might not degenerate. The Romans, it is said, kept pedigrees of their progeny. Columella gave advice about the breeding of fowls, noting form and colour, and contended that the best breeds should have five toes. Tacitus states that the Celts attended sedulously to the races of their domestic animals, and Cæsar remarks that they paid high prices to merchants for fine imported horses.

From the earliest historical times to the present there are facts in abundance, all tending to the conclusion that man has always either unconsciously or intentionally interfered to modify the characters of the lower animals to suit his own taste or convenience. And in so acting he has not been guided by knowledge of any scientific system, but simply by his own common sense and every-day observation. It would naturally occur to one who wished to get cattle with long or short horns, to select the parents which possessed the coveted qualities in the highest degree. The earliest breeders who had recourse to artificial selection had no precedent to guide them beyond the common one always before their eyes of the general resemblance of the offspring to the parents, and what they did, whether capriciously or with a determined object, was done under the guidance of instinct rather than reason.

Biologists, in attempting to develop the practice of breeding into a science, have been forced to proceed without the guidance of any principles, save those which they have deduced from the ordinary practice of breeders, and the greatest service which authorities like Youatt, Marshall, Darwin, and Herbert Spencer, have rendered to agriculture are exhibited in their laborious collections of the works of practical men in all times—works which they have classified, and from which they have deduced laws which will regulate the proceedings of the future. The art of breeding cannot therefore be said to be based on scientific principles, because all that is known of the science of breeding is based on the results of the practice.

It is not probable that the old-world breeders of stock knew anything of homogenesis and heterogenesis; of inheritance or reversion; of prepotency or latency; of the influence of acquired, as compared with established, defects, yet they were quite familiar with all the facts which later observers have used as a basis for the formulation of laws which are dis-

tinguished by those terms. Without accurate knowledge of correct principles, which, indeed, were not then known, the earlier breeders did great things, and if there is any charge to be brought against modern breeders it is that they do not pay enough attention to the principles which their practice has enabled scientists to define.

A careful study of the laws of life will be useful to breeders, not so much in the direction of teaching them things of which they are now ignorant, as in reminding them that their ordinary practice often falls short of the knowledge which they really possess. For example, it is possible to exercise the utmost care to avoid the transmission of inherited peculiarities while ignoring or quite disregarding the presence of acquired defects. And again, a breeder who set himself to perpetuate and render permanent a quality which he holds to be an excellence, selects one or both parents which possess the quality, but is seemingly unable to realise the obvious fact of the existence in one or both parents of grave defects which he has no intention of cultivating, nor the least desire to have transmitted, even in a mitigated form, from parents to offspring.

It is undoubtedly difficult for a breeder to reject a sire or a dam which possesses in an eminent degree the perfection of form which he is most anxious to fix in his herd or flock, on account of the presence of a minor defect, although his own practical experience has taught him that the defect may be exaggerated in the next generation, or failing to appear at all in the first offspring, it is likely to assume a most pronounced character in the second generation. In carrying on his work, the stock-breeder has need not only of practical knowledge but of science, which is the classification of the knowledge gained by others, and it must be evident that a perfect familiarity with all that has been found out in the past will materially aid the procedure of the present and the future.

HEREDITY.

In the language of the biologist, heredity means the law of inheritance; not of disease in particular, but of colour, form, disposition, habit; in fine, of every quality, good or bad, congenital or acquired, of every structure and function which go to make up the living organism. This definition is simple and comprehensive, and it is necessary to fix the meaning of the term quite clearly, because it is strangely misunderstood by practical men.

Difference of opinion as to what diseases are hereditary and what are not, is deemed to be quite permissible if not

inevitable; and taking into account what the breeder means by an hereditary disease, it must be allowed that various observers must entertain different views. Hereditary disease, in the popular acceptation of the term, seems to mean any disease which has been inherited, and is for that reason likely to be transmitted; whereas the scientific pathologist extends the definition to include any disease which is transmissible from parent to offspring, avoiding the limitation of the terms to those diseases which are inherited before they are transmitted; an important distinction, the significance of which will appear further on.

Heredity is related to life and organisation, to all living things, plants and animals, which appear, in endless succession. Heredity is therefore a phase of genesis, a multiplication or perpetuation of living things, the continuous production of organic beings which are true representations of the forms of their parents; at least this is the case with all the higher organisms which come under our daily observation. But large families of living beings produce an offspring which at no period of its life resembles its parents, and not until several generations have been developed does the form of the parent appear. This departure from what would be considered the rule is called heterogenesis, the other is homogenesis, or like producing like.

Heredity, or inheritance, is an universal law, and all forms of variation, heterogenesis, and atavism, or throwing back, are, so far from being opposed to this law, proofs of its influence. Heredity is not necessarily direct, but the type is certain to be perpetuated, although its continuity may be disturbed.

Heredity is illustrated in the transmission of type, but also of peculiarities, which may be: (1) Congenital; or (2) arising from changes in the life of the individual by whom they are bequeathed. This fact is constantly lost sight of by breeders. They do not hesitate to accept the doctrine of inheritance of congenital characters, excellences or defects; but it is not so clear to their minds that qualities or defects which have been acquired or induced by changes in the life of the individual may be transmitted to the next generation, and yet the facts open to common observation are numerous enough in support of the position. For example, alteration in bulk from increased action, as shown in the enlargement of the udders of cows from the practice of milking, an increase which is rendered permanent by selection.

The direct inheritance of acquired peculiarities is proved by many examples. Mr. Lewes refers to a case of a puppy taken from the mother at six weeks old. The mother had been taught

to beg, and it was observed that the puppy took to begging for what it wanted when about seven or eight months old, although it had never been taught that accomplishment. And instances are recorded of sporting dogs which have developed certain habits to which their parents had been addicted. Every sportsman is familiar with the inherited tendency of pointer puppies to point, of hounds to hunt by scent, and greyhounds by sight.

Instances of hereditary transmission of peculiarities originally produced by modification of function are common enough in the human race, and would doubtless be recognised as common in animals if the same pains had been taken to note and record them.

Mr. Herbert Spencer remarks that the descendants of Irish immigrants in the United States lose their Celtic aspect and become Americanised. Equally is this the case with immigrant Germans. Modifications of organs, due to changes of function, are also frequent. Thus large hands are inherited by people whose ancestors led laborious lives, whereas the descendants from those unused to manual work have small hands. Short sight, induced by particular occupations, is also inherited, and even mental qualities, tone of voice, acquired peculiarities of accent and artificially-acquired disease are capable of hereditary transmission. A curious instance in the experiments of Dr. Brown-Séquard is quoted by biologists. In the course of his inquiries the physiologist discovered a means of inducing epilepsy in guinea-pigs, and after a time he found that the young of these animals were epileptic.

In an experiment carried on some years ago at the Royal Veterinary College on the transmission of tubercle, rabbits were infected both by ingestion of and inoculation with tuberculous matter. Some of these animals, while affected with tubercle artificially induced, brought forth young ones, which were found to be affected with the same disease. The diseased organs were preserved, and the true character of the malady is apparent on naked-eye inspection; it has recently, however, been proved by microscopic inspection.

This risk of the inheritance of acquired defects is, so far as practice is concerned, entirely ignored or vigorously disputed. A common contention, on the part of a breeder, in reference to the use of an unsound sire or dam, is that the defect occurred from accident or from disease depending on common causes. A sprain or a blow may cause the development of a spavin or splint. A blow on the eye may induce inflammation, ending in cataract. An ordinary cold may go on to bronchitis, and on recovery from the acute disease, the horse indicates in an unmistakable way that he is a roarer.

In all the cases above cited—and they might easily be multiplied—a breeder would laugh at the suggestion that the unsound animals could not safely be used as parents. His answer to all objections would be, that the defects could not be hereditary because they were accidentally developed, *i.e.* were not derived from the parents of the diseased animals, but were due to circumstances occurring in the lives of the affected animals; were, in fact, acquired and not bequeathed. This line of argument is commonly accepted as sound, but it must be evident that it summarily dismisses, as unworthy of thought, the important law of heredity in respect of acquired defects.

Those who may accept the doctrine of the inheritance of defects due to change of conditions of life, will be disposed to look upon the cure of inherited or acquired disease of structure or function rather in the light of a misfortune, so far as breeding is concerned. A recovered roarer, for instance, whether his cure was due to medicine or surgery, would be in the breeder's stud a roarer still, but in the disguise of a sound animal.

Tuberculosis is among the diseases which are ranked as incurable. But if the public expectation should be in any degree realised, and the cure or even the considerable relief of the disease become possible, the results to future generations of cattle, and to some extent sheep and swine, will be nothing less than disastrous. At present an obviously consumptive animal would not be used for breeding. The errors which are committed in that direction are presumably committed in ignorance, and in default of accurate means for the detection of the disease in its early stages; but an animal cured of tuberculosis would not exhibit any signs of disease, and therefore would escape detection, and like the cured roarer, might be used for stud purposes without any suspicion. Meanwhile there is no reason to believe that the artificial arrest of a morbid process by the aid of medicine or surgery in any degree affects the law of heredity, or modifies the potency previously possessed by the diseased animals to transmit the affections to their offspring.

Heredity in regard to tuberculosis bears varying degrees of significance in the minds of different pathologists. Some hold the view that the bacillus of tubercle or its spores are actually conveyed from a tuberculous parent to the offspring, *in utero*, and in consequence the young animal is born with the seeds of the disease in its organism. The law of latency may operate in such cases, and the individual may give no sign of the deadly malady which lies waiting for the favourable moment. Meanwhile a cold of unusual severity may cause the lung tissue to assume the precise condition which suits the bacillus, and it forthwith begins to grow; or a blow on a joint may set up

inflammation, and presently all the signs of tuberculous arthritis are recognised, or it may be that the victim remains apparently free from disease until a certain age is reached.

Darwin quotes many instances of the appearance of peculiarities of structures and of certain diseases at particular periods of life. Perhaps the most wonderful instances of inheritance at a remote period of life, having regard to its duration in the organism concerned, is exhibited by those animals which pass through a series of larval stages, each one having an independent life, before they assume the form and characters of the parents.

In the case of the common fluke, looking at the embryo as it emerges from the egg, then at the sporocysts, then the rediæ, and even the more advanced cercariæ, the observer would be inclined to insist, that the law of inheritance has no force in this and in similar cases. But he has only to wait for the attainment of a certain age, that of maturity, to discover that the early life has been merely the stages of embryonic development, and the principle of heredity is illustrated perfectly at the fixed time.

A commonly quoted example of inheritance of structural peculiarity is that of the Lambert family, in which porcupine-like excrescences appeared upon both the father and sons, about nine weeks after birth.

It is well known that certain diseases in families go on from one generation to another, regularly attacking the subjects at certain ages, St. Vitus's dance in youth, consumption in early life, gout in advanced life.

Dr. Prosper Lucas does not hesitate to write that various classes of diseases, not in any way related to particular periods of life, tend to appear in the children at the same age that they appeared in the parents. Among the cases quoted by Darwin are: blindness in the family of Le Compte, which was transmitted to twenty-seven children and grandchildren, beginning always between the fifteenth and sixteenth year, ending in total loss of sight at the age of twenty-two; deafness in a family affecting two brothers, their father, and his father at forty; and insanity in a family, grandfather, father, and son, who all became insane and committed suicide at the age of fifty.

No difficulty would be experienced in multiplying instances of inherited disease at certain ages, but all of them refer to the human subject, and the stock breeder may enquire in what lies their interest for him. Unfortunately we do not keep records of family histories of the lower animals with sufficient minuteness of detail to enable us to learn much from them, and the appearance of inherited disease in thoroughbred stock is more

likely to be concealed than advertised, so that we can only infer, though with good reason, that what is true of man is also true of the beast, at any rate the probabilities are in favour of this conclusion.

Now and then we hear of the appearance of inherited disease among animals at certain ages; for example, the progeny of a stallion who became a roarer at four years old are said to have shown the same disease at the same age. Similar stories are told of the occurrence of blindness, and also of certain forms of lameness, navicular disease, and spavin in particular, at a certain age. There are not any authentic records of these cases; but the recital of them bears with it the support of an inherent probability; and there can be no doubt that, if breeders would allow the world to have the benefit of their observations and experience, a good deal of light would be thrown on a very obscure subject.

Peculiarities may be latent in one generation and apparent in another; for example, a parent may have a child in which some speciality of form or character not possessed by the parent is evident. By-and-by, the same character is seen in the parent, and if the child had been born after its manifestation, instead of before it, this would have been taken as an instance of direct transmission. Again, cases are recorded of intermittent or interrupted transmission of character or defects, so that the progeny in the first generation may be nearly or quite free from them, while they become more prominent from time to time.

A very remarkable case of this capricious form of inheritance is quoted from Dr. Struthers, by Herbert Spencer, Darwin and other biologists:—

"The great-great-grandmother, Esther P—— (who married A—— L——), had a sixth little finger on one hand. Of their eighteen children (twelve daughters and six sons), only one (Charles), is known to have had digital variety. We have the history of the descendants of three of the sons, Andrew, Charles and James.

"(1) Andrew L—— had two sons, Thomas and Andrew; and Thomas had two sons all without digital variety. Here we have three successive generations without the variety possessed by the great-grandmother showing itself.

"(2) James L——, who was normal, had two sons and seven daughters, also normal. One of the daughters became Mrs. J—— (one of the informants), and had three daughters and five sons, all normal except one of the sons, James J——, now æt. 17, who had six fingers on each hand.

"In this branch of the descendants of Esther, we see it passing

over two generations, and reappearing in one member of the third generation, and now on both hands.

"(3) Charles L——, the only child of Esther who had digital variety, had six fingers on each hand. He had three sons, James, Thomas, and John, all of whom were born with six fingers on each hand, while John has also a sixth toe on one foot. He has also five other sons and four daughters, all of whom were normal.

"(*a*) Of the normal children of this, the third generation, the five sons had twelve sons and twelve daughters, being the fourth generation, all of whom were normal. A fifth generation in this sub-group consists as yet of only two boys and two girls, who are also normal.

"In this sub-branch, we see the variety of the first generation present in the second, passing over the third and fourth and also the fifth as far as it has yet gone.

"(*b*) James had three sons and two daughters, who are normal.

"(*c*) Thomas had four sons and five daughters, who are normal; and has two grandsons also normal.

"In this sub-branch of the descent, we see the variety of the first generation, showing itself in the second and third, and passing over the fourth, and (as far as it yet exists) the fifth generation.

"(*d*) John L—— (one of the informants), had six fingers, the additional finger being attached on the outer side, as in the case of his brothers, James and Thomas. All of them had the additional digits removed. John has also a sixth toe on one foot, situated on the outer side. The fifth and sixth toes have a common proximal phalanx, and a common integument invests the middle and distal phalanges, each having a separate nail.

"John L—— has a son who is normal, and a daughter, Jane, who was born with six fingers on each hand and six toes on each foot. The sixth fingers were removed. The sixth toes are not wrapped with the fifth as in her father's case, but are distinct from them. The son has a son and daughter, who, like himself, are normal.

"In this, the most interesting sub-branch of the descent, we see digital increase, which appeared in the first generation on one limb, appearing in the second on two limbs, the hands; in the third on three limbs, the hands and one foot; in the fourth on all the four limbs. There is as yet no fifth generation in uninterrupted transmission of the variety. The variety does not yet occur in any member of the fifth generation of Esther's descendants, which consists, as yet, only of three boys and one girl whose parents were normal, and of two boys and two girls,

whose grandparents were normal. It is not known whether, in the case of the great-great-grandmother, Esther P——, the variety was original or inherited."

ATAVISM OR REVERSION.

From the facts which have been stated in the preceding pages, it must be evident that successful breeding is in a great degree based on a knowledge of pedigree, *i.e.* a history of the ancestors of a race, and it is also clear that the more detailed the history is the more valuable it will prove to the breeder. In the absence of a knowledge of pedigree the stock-owner fears to use the most perfect animal for stock purposes, because he has to incur the risk of what he significantly calls "throwing back," or, in the language of the biologist, atavism; meaning thereby the chance of some defect of the forefathers, perhaps some generations back, being inherited through the agency of the unknown animal which he proposes to use as a sire or a dam. A pedigree is valuable according to the time during which there is clear evidence of an unblemished descent, and the danger of crossing lies in the absence of this evidence. A common expression shows that this risk is appreciated by the breeder, who is apt to say, "You never know what you will get." One thing he knows, however, which is the irreparable mischief arising from a single bad quality introduced by a cross. A long life may be too short to correct a mistake such as this.

Even the most careful breeder may blunder inadvertently in selecting an apparently unexceptionable sire or dam by fixing his attention on one special excellence, and failing to look for a disease or defect in the animal or its forefathers, the history of which he might perhaps have learned if he had cared to inquire.

BREEDING IN-AND-IN.*

Unregulated breeding, or what may be called unchecked crossing, tends to the production of a race possessing uniformity of character, qualities which fit the individuals for their surroundings. By selection, the breeder in time succeeds in getting distinct breeds, and in order to preserve them from change, he is disposed to keep closely to the strain which he has produced by inter-breeding. This practice has been condemned from remote times as being calculated to diminish the vigour of the race. The idea, it may be observed, is based on observations, chiefly relating to the human being, and not on any physiological law.

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* See also Note-Book, p. 236.

Stock breeders have not paid much respect to the alleged evils of inter-breeding, and modern biologists do not hesitate to admit that the statements respecting them do not rest on any very firm basis. Undoubtedly one necessary consequence of inter-breeding is the inheritance of diseases which may belong to families—insanity, epilepsy, gout, &c. But it is palpably absurd to attribute these ills to inter-breeding, when they are clearly due to direct inheritance, and would have been transmitted from diseased parents, whether closely related or belonging to different races. The history of some of our most celebrated breeds proves that inter-breeding is a system which has special advantages to recommend it. But it is necessary for the breeder to remember that the selection of parents possessing health and vigour is essential to his success.

Instances of loss of fertility and degeneration from inter-breeding are not uncommon.

Sir J. Sebright asserts that he has seen strong spaniels, by close breeding, degenerate into weak and diminutive lap-dogs. Pigs are said to be specially susceptible to the effects of inter-breeding, and many cases of loss of fertility from this cause are narrated, and it is recorded that a single cross restored the lost powers.

On the other side of the question Mr. Fisher Hobbs, the breeder of the improved Essex pigs, divided his herd into three families, and continued for twenty years to inter-breed by judicious selection from the three lots. In spite of occasional failures, which after all only indicate that inter-breeding requires care, the advantages of the system are too well established to leave any room for doubt.

Mr. Coate, a very successful breeder of pigs, is credited with the remark that crossing answers very well for the farmer, as he will get more constitution and quicker growth. But for breeders who sell pigs for breeding, crossing will not answer, as it requires many years to get anything like purity of blood again.

Under all the circumstances the proper course for the breeder of pedigree stock to pursue is to keep to the true type by inter-breeding, selecting parents with great care, to secure perfect freedom from congenital or acquired disease, watching meanwhile for any signs of weakness which might indicate that he is going too far—an error which is to be corrected by introducing fresh blood, without departing from the type which he is engaged in cultivating to a state of perfect development—always bearing in mind that crossing is a retrograde movement, which is sure to lead to complications which he may be powerless to correct.

It may be useful, in concluding this mere introductory sketch of a vast subject, to ask what is the practical advantage to the breeder of a knowledge of the matters which have been referred to, or of the facts which have been quoted. And the answer is, that the knowledge will be useful in proportion to the extent to which it is applied. It may be a new thought to the practical man that inheritance is the rule, not the exception, and that he should be more surprised to observe that an excellence or a defect is not transmitted, than to discover that it is. The question with him should not be—Is this a disease which is likely to appear in the progeny at once, or at a more distant time? but—Is the disease one which is so comparatively unimportant as to be counterbalanced by the dominant good qualities of the animal? Or is the sire or dam known to be prepotent in transmitting the special qualities which are demanded, so that the defect is likely to be eliminated?

It may seem to be an embarrassing addition to the breeder's duties to call upon him to consider questions of heredity in regard to congenital and acquired defects, atavism and latency, and the influence of prepotency as a correcting power. Yet it is true that all these subjects belong to his art. And if he is to keep in the front rank in competition with the live stock of the world, no matters of importance, indeed no trifles, must be neglected, if they promise to aid him in his arduous work.

VIII.—*The Co-operation of Producers in the Sale of Farm Produce.* By Professor JAMES LONG.

THE subject of co-operation among farmers for the direct sale of their produce to the consumer has been frequently handled during the past ten years, but the dreams of those who have foreshadowed what may yet come to pass have so far not been realised. The merchant or middleman and the retailer still stand between the producer and the consumer, while the possibilities of their early supersession are scarcely within the range of practical discussion. The reason—or shall we say the chief reason?—for there are others—is that farmers are not trained in those essentially traders' habits, those attentions to small details, which consumers demand, and which almost alone contribute to success in a retail establishment supplying large numbers of persons of almost every class of society. In the ordinary business of selling farm produce direct to the consumer, a number of trades are engaged. The baker provides bread and flour;

the butcher, beef, mutton, and veal; the pork butcher, pork, and the minor foods prepared from it; the provisioner, bacon, poultry, cheese, butter, and eggs; the dairyman, milk, cream, and butter; the greengrocer, vegetables and fruits; the corn dealer, grain, hay, straw, and corn offal—and so on with regard to every product of the farm. These tradesmen are all expert, conducting their businesses with an eye to every chance—interviewing every new comer, ministering to the slightest wish of every buyer worth serving—and in some cases occasionally dealing in a little sharp practice in the sale of foreign or inferior goods. In almost every case they are working for themselves alone, whereas under no conditions does it seem possible for farmers to sell direct unless through an *employé*, who even though one of themselves cannot fight on even terms with the specialist traders opposed to him. Supposing him to be assisted by trained servants in each branch of business, the same objection exists, however liberally they may be paid. That co-operation has succeeded in connection with the great Services is no answer to our objections. The "Stores" appeal to classes who regard these great establishments as their own. The customers are centralised, whereas the classes who might be expected to take a similar interest in the farmers' stores are decentralised. There is, too, another difference and one of great moment—at the stores the selection of goods is unlimited; no preference is shown in favour of the produce of one man or even of one country over another—in a word the stores represent a concentration of a large number of the best shops in every trade. The buyer is unfettered, he can obtain anything he requires, and he obtains it too at a reduced price—in consequence of the minimisation of expenses consequent upon centralisation and cash payments—hence his continued support of the establishment. If we refer to a co-operative system of another kind, that of which the Co-operative Wholesale Society is the fount, we find still greater support in favour of these arguments, for while the principle upon which the business is conducted is the same—the bulk of the goods, which would be denominated as farm produce, are purchased abroad by resident buyers, inasmuch as they are cheaper than the farmers of this country could sell them. This fact is of startling moment, for it suggests that the teeming millions of those classes who are compelled to value every shilling they spend, are patrons of the foreign rather than of the British farmer, and can only be depended upon to buy of the latter when his produce is unusually low in price. They will relieve him of the inferior goods he grows; but such goods never pay him; hence, as it would not pay him to establish direct communication with the consumer for the purpose of their sale, he

can scarcely reckon this vast portion of our population as a factor in his account.

We have referred to the leading trades connected with the distribution of farm produce; let us shortly review some of the points which would have to be considered were such trades proposed to be established between the farmer and the consumer direct. The baking trade is one which has been brought to a high state of perfection, and which demands the highest skill and intelligence in its conduct. We have seen the great bakeries of the leviathan Co-operative Society at Manchester, which might be and doubtless are duplicated wherever a large sale of plain good bread is effected to a working population. It would, however, be quite another matter if it were necessary to provide bread and confectionery for the wealthier classes, whose exactions are well understood, and who can at this moment obtain a hundred samples of fancy breads within a small radius of their doors, at least in London. One of the most economical functions of the baker's business is that of blending of flours. He says it is a necessary proceeding—perhaps it is—but in this process he employs enormous quantities of foreign flour which experts have often declared are really used on account of their capacity to absorb water, to such an extent, indeed, that ten more loaves can be made per sack of flour when the flour is three parts foreign. Granted that bakers of the highest skill could be employed in the manipulation of home-grown flours, it still follows that they would be placed at a disadvantage as compared with the ordinary trade—first, because the profits are not so large where foreign flours are left out of the calculation, and next, because they could not present such a variety of fine breads, especially as the best Buda-Pesth and Minneapolis flours could not be requisitioned.

If we refer to the meat trade we find difficulties of still greater importance. It is next to impossible for the flock-master to obtain such prices in the London retail trade as he commands in the country. We have repeatedly observed that when London prices have been 7*d.* to 8*d.* per lb. by the Smithfield stone for the best mutton, farmers living in different districts have been obtaining 9*d.*, and even more. In a paper upon "The Sources of our Meat Supply," I have calculated that in the year ending Sept. 30, 1890, our gross imports of mutton amounted to 206,158,000 lbs., but that our gross home production reached 869,888,000 lbs. Our consumption of foreign meat has increased from 8½ lbs. per head in 1867–9, according to Major Craigie, to 37·3 lbs. per head, according to my own calculation, for 1890. That increase has mainly gone to the industrial classes, for it is they who have

consumed the bulk of the increase as shown in our total meat supply. This fact, together with the fact indicated by the above figures, suggests a reason why home-grown mutton maintains a good price in the country, and next why mutton sent to London, brought into competition as it is with imported mutton, fails to command the country figure. As regards beef, there are difficulties which do not exist in connection with a mutton trade. A farmer can, and sometimes does, slaughter sheep as he slaughters pigs for transmission to Smithfield, but he would hesitate before slaughtering cattle. In the first place, the offal of a bullock which London buyers find it so convenient to sink, is valued (according to Tallerman) at 3*l.*, this including many portions which a farmer could not conveniently or economically dispose of. Suppose, however, such troubles were successfully overcome, a further difficulty has to be faced. London butchers cater for various classes of the purchasing public; they can select the joints they require in the wholesale market, where the West End butcher picks up the rounds, ribs, and loins, leaving the legs, flanks, briskets, and the remaining inferior parts to the butcher of the East End, whose business it is to provide meat of a cheaper kind. Under a co-operative system, unless it combined a wholesale department, it would be extremely difficult to reconcile these two practices. The London public is particular, the rich do not patronise the butchers of the poor, while the poor are extremely shy of shops which conduct a high-class trade. Although the same difficulties arise to some extent in connection with the fresh pork trade, we do not see the same objections to a profitable sale as in the case of mutton. The fresh pork trade is almost entirely a home trade, and London is one of the very best markets we have. All pigs do not, however, go to market immediately they are slaughtered; on the contrary we consume more salt pig than fresh pork; and further, our consumption of imported pig meat is a trifle more than our consumption of home-grown pig meat. This is an important fact to bear in mind, for it could not fail to influence any business dealing alone in British produce. I take the following figures from my Report already referred to:—

TOTAL available SUPPLY of PIG MEAT for the year ending September 30, 1890.

United Kingdom.	Imported.	Per head. Imported.	Per head. Total supply.
lbs.	lbs.	lbs.	lbs.
542,634,000	545,997,000	14·3	28·6

As our imports of live swine amounted only to 477 tons, it is evident that the quantity of fresh pork not of home growth sold in our markets was very small indeed, and that half our total consumption of pig meat was imported salt meat, or very much more than half, if we estimate the large quantities of pig meat which are cured in this country. As regards the pig trade, then, it follows that a farmers' movement would have to deal with the subject of curing bacon and hams, necessitating further ramifications and responsibilities.

Let us next take the case of the dairy farmer and examine how far it would be possible for him to benefit by co-operation for retail sale. A farmer making cheese from the milk of one hundred cows produces some 20 tons per annum. It would require a retail business of considerable scope to sell so much cheese of one make over the counter. What then would become of the hundred makers who might wish to participate in the economies of the establishment? London, like most of our large provincial cities, is flooded with second quality, and foreign cheese which traders push to the front in consequence of its lower cost. Of the fine qualities the quantity in the market is never sufficient, it is true, but what there is, is distributed far and wide, and although each trader might sell a great deal more at top price, there are none who could dispose of such quantities as makers could send if the inducement were sufficiently tempting. In the cheese trade the losses by shrinkage are by no means inconsiderable, and if only for this reason it would be next to impossible to keep large stocks in hand. Again, success in the cheese trade, at all events as regards the bulk of sales, depends upon the nature of the stock kept; unless goods could be sold at prices such as are asked for Americans, New Zealands, and Dutch, the largest portion of the cheese-eating constituency would be lost to the trade There is no apparent possibility of successful co-operation in this branch of farm industry, except in the wholesale business. As regards butter, it is probable that among large populations, which alone afford a means of conducting a large retail trade, at least three pounds of a foreign make is sold for every pound made in the United Kingdom. We are unable to see how this position of affairs is to be remedied. The value of milk in this country is, in all but a small minority of districts still remote from town and rail, too great to permit of its being converted into butter for sale at such prices as would enable farmers to compete successfully against the foreign exporter. Unless the ubiquitous Frenchman, Dutchman, or Dane successfully land new milk in our markets from day to day we are of opinion that the value of milk will increase rather than diminish; and if

will be well for the farming community if this is so, as, in spite of the great impetus given to butter-making by the educational movement, we do not believe for one moment that it will enable our people to make any lasting impression upon the imports. Our butter, when made by experts, is unsurpassed by that of any other nation, but the pre-eminence attaches only to individual dairies, not to factories, which, in following the "uniformity" rage of the continent, have in some respects levelled down the quality, whilst in others they have levelled up. To make in bulk for the market the factory system is necessary, but that very system brings us down to the level of the Frenchman who blends mild butters for our market, and who, having obtained previous possession, cannot be expelled. What then would co-operation do for the butter-making farmer? It could not dispose of a multitude of dairies, inasmuch as, however good, the samples would vary in fifty ways; whereas to blend would have an undesirable effect, that of reducing the value. We are of opinion, and it is one that has forced itself upon us, that the private butter-maker will do better by obtaining his own *clientèle*. Factories can at present take care of themselves, but should they largely increase in number it is possible that combination for wholesale distribution would prove a valuable medium of making a market.

The sale of milk and cream presents much greater possibilities of success than the sale of any kind of produce, which we have so far discussed, chiefly because of the absence of foreign competition. It is easily conveyed from country to town, and although the railway companies retain from 15 to 20 per cent. of its value for the trivial, yet necessary, work they perform, and seek to impose still higher charges, it is consumed in very large and regular quantities, and is believed to return large profits. The milk trade, however, is a difficult and precarious one. Retailers are as numerous as flies, and mostly as keen as spiders, with the result that customers expending a penny a-day are nursed with unceasing attention; while a new comer is a signal for the exercise of ingenuity on the part of numerous carriers, who are anxious for his custom for the sake of the half-crowns which are attached to success. Indeed, such is the competition, that house-agents' clerks are sometimes similarly rewarded for conveying early intimation of the names and addresses of persons who are about to occupy empty houses. The cost of milk distribution is enormous, much greater, in fact, than is supposed by those who draw imaginary pictures of the stupendous profits which are suggested by a payment of 6*d.* per gallon to the farmer, and a receipt of 4*d.* a quart from the consumer. While we are aware that milk

is delivered in London and other towns as low as 3*d.* a quart, we know as a positive fact that 11*d.* and 1*s.* a gallon is often paid during the winter months for milk of high quality. While therefore the best firms are willing to take smaller profits in order to provide a first-rate article and retain their customers, there are itinerant traders who undoubtedly impose a mixture of separated and new milk upon the public, for which they charge 3*d.* the quart, in order to effect a sale. In London, and we believe the fact holds good in some of the largest provincial cities with whose trades we have some acquaintance, it is next to impossible to build up a retail trade without large expenditure. It is necessary to buy up existing rounds, and having done so to make every effort to retain them. The quicksands of the London trade at least will be rapidly reached unless the control is in the hands of men who are intimately acquainted with the tricks of the carriers on the one hand, and of the customers on the other.

We next come to vegetables and fruit, which at the present moment do not constitute a very important item in the ordinary agricultural *régime*; but could it be shown that farmers could grow either with greater advantage, and sell without exaction and jobbery, a change would speedily take place. At this moment the trade is such that the grower stands to lose—the salesman can scarcely fail to gain. The system provides very occasional prizes and daily blanks. In some instances buyers will deal on the farm, purchasing by the acre, or by measure, or weight; but the great medium is the salesman, whose method of procedure, except in a minority of honourable instances, entails serious loss to the farmer. So long as this system exists, so long will there be men practised in imposture, who will remain in the ranks of salesmen, the facilities for fraud being ample, and the fraud itself of a kind which is unpunishable, because almost incapable of legal proof. Our great societies have often been urged to prosecute those who sell adulterated foods and manures; but there is no fraud connected with farming which so much needs repressive action as that to which sellers of vegetables and fruit are subject.

The trade in hay and straw is a very large one, and there is room for a farmers' medium here. We are acquainted with a firm, one member a successful farmer, which, commencing as salesmen not long ago, reached a weekly sale of 2000 tons of hay alone in little more than twelve months. Growers have been obliged to sell as they needed the money—buyers like these have purchased outright for cash, made good profits, and being able to sell at low prices, have built up a connection at the same time. Unfortunately railway charges preclude consignments

to London from every county, even when advantage is taken of the rates for pressed bales. While, however, the many respectable firms of wholesale buyers seldom go far away from their regular supplying customers, the great bulk of growers are compelled to trust to the mercies of the salesman, and therefore we see no reason why a market, wholesale and retail, could not be established for hay and straw, to which vegetables and fruits might be added. Facilities will doubtless be provided for "General" Booth to sell the produce of his projected farm colony in this way for the benefit of the "gutter sparrows" of London, but it remains for the farmer to combine with the railway companies, who could without very great expense establish markets adjoining their termini to which buyers and sellers, wholesale and retail, could alike adjourn for business. In giving evidence upon this subject, the manager of the Great Eastern Railway Company said that he attached the utmost importance to all future markets being connected with a railway, because the trucks containing vegetables (and we might add other produce as well) can then go into the market, so that the cost of carting from the station to a market is then avoided. At this moment certain markets are supplied by certain farmers, and there is no reason why these producers should not be organised, and therefore in a position to market on their own terms, instead of upon the terms of others, who are a comparatively small minority. There is a large wholesale vegetable market, chiefly potatoes, connected with King's Cross Station—it is convenient, and has doubtless assisted the grower; but if that market were absolutely in the hands of those who consign their produce to it, how different might be the results. It is, in fact, a middleman's market, and partakes of all the evils as well as the advantages, such as they are, of the middleman's system in this class of trade. While once more admitting freely that there are many honourable exceptions of firms who return the highest possible prices for goods consigned to them, we are assured, from personal and other experience of the present system, that failing co-operation there is no one subject connected with agricultural sales which needs the attention of our Legislature more; subjects such as Tithes, Corn Returns, the Agricultural Holdings Act, Boundary Fences, pale in importance when their respective influences upon the farmers' finances are compared with the losses which are inflicted upon him by many of those to whom he trusts the sale of produce upon which so much depends.

We have attempted to show that one of the most important aids to co-operation is a wholesale and retail market actually adjoining a station. There is another which is little if at all

inferior in importance, where a market is intended for the reception of perishable as well as non-perishable produce. We refer to the cold store to which perishable produce can be consigned at any season for preservation until a favourable opportunity for sale arises. It is by the help of refrigeration that New Zealand has sent us four-and-a-half millions of carcases of mutton—that she has commenced her butter trade; refrigeration has helped the butchers in the Central Smithfield Market to protect themselves from serious loss during the hot season, for they not only have numerous cold stores attached to their stalls, but a huge series of chambers under the market itself which we have had the advantage of inspecting; and it is by the adoption of a similar system that such firms as Spiers and Pond are able to buy meat in a cheap market, and game in season, both of which are stored for future use, when the one is dear and the other out of season. The farmers in Wales and in many parts of England who make and store butter for the trade are presumably content to accept 8*d.* to 11*d.* per pound. If this butter was stored while quite fresh, the cost would probably be little, if any more, than the value of the abundant salt used under the present system, but the prices returned might, and in many cases would, be from 25 to 35 per cent. higher. What is true of meat and butter is equally true of other perishable goods. In addition to the inspection of a number of cold storage systems in London, we have inspected the fine cold storage of Mr. Koopman, of Hamburg, who slaughters a thousand swine daily for the London market. Here, again, is an instance of a huge business which absolutely depends for its existence upon refrigeration. Here, too, we learned the importance of conducting such a business upon a large scale, for portions of the animal, which under ordinary circumstances are unsaleable, afford the means of numerous subsidiary businesses in which the stereotyped German sausage plays no unimportant part.

We are acquainted with two gentlemen both of whom farm a large acreage who are principals in large business concerns, one in the north and the other in the south of England. By such an arrangement as mutual advantages ensure, these gentlemen have been enabled to sell large quantities of meat of their own production to their very numerous *employés.* In these cases there is a species of co-operation on the part of the buyers, who practically undertake to divide so much meat between them, otherwise it would be folly to slaughter a bullock. Is there any reason why similar bodies of workmen, numbered by hundreds, should not be able to benefit by advantages offered them by farmers who hold no direct relationship to them, just as they now benefit by the advantages offered at the co-operative stores.

which are spread so largely throughout this country? Let us in a few lines show how gigantic this great working-class movement has become. The co-operative store movement is practically run by the Committee of the Co-operative Wholesale Society, Limited, whose mammoth headquarters are at Manchester. Since the date of its establishment in 1864, the society has sold goods to the net value of 75,000,000*l.*, the sales in 1889 amounting to 7,000,000*l.* In all there are 699,000 members, with a total capital of 1,392,000*l.* The net profits have gradually risen to 100,000*l.* Buyers and salesmen are distributed over all parts of this country, while six reside in Ireland, and six in America, France, Germany, and Denmark, their business being chiefly directed to the purchase and forwarding of butter, cheese, and eggs, for the society has six steamships of its own. The Irish butter purchases in 1889–90 reached 111,599 firkins, or 10,580 less than in the preceding year, while the Danish purchases of butter, eggs, and bacon, reached 209,562*l.* in value. Other figures show that the Irish are losing sales while the Danes are increasing. Thus while the weight of Irish butter purchased in 1889 reached 34,021 cwt., it fell to 30,564 cwt. in 1890. On the other hand, the foreign purchases amounted to 49,071 cwt. in 1889 and 56,809 cwt. in 1890. This was chiefly Danish butter, as, although butter is purchased in Sweden, France, Germany, and Holland, the total sales in either country do not nearly approach those of Denmark. Connected with the society are 1106 branches, including some in the Colonies and on the Continent of Europe. The members in connection with these branches received no less than 20,389*l.* in the form of dividends, at the rate of 3*d.* in the pound, while a small sum was paid to non-members, who were allowed 1½*d.* in the pound. As already remarked, the *clientièle* of these stores is chiefly among the industrial classes, who pay cash, and who are induced to go as far as possible to one establishment because of the pecuniary advantages they receive in the form of dividends; while, however, the chief society buys in the cheapest market irrespective of its nationality, there is no reason why it—an organisation of vast proportions and gathering strength—should not be brought into the purview of those producers who are willing to organise for the purpose of supplying it upon such terms as may induce it to buy. There is, however, another suggestion which occurs to the writer, who has had the opportunity of attending one of the great business gatherings of delegates at the Central Hall in Balloon Street, where the Co-operative parliament disposes of its work with a skill and rapidity which it would be impossible to excel. The Chairman, Mr. Mitchell, a shrewd,

clear-sighted, and very capable man, is the model of what a chairman of a business meeting should be. With a decision worthy of imitation, he keeps each speaker absolutely to the point, prevents long speeches, and gives a tone to the immense meeting which is refreshing to those who are accustomed to associate meetings of delegates of industrial societies with the propagation of ideas of an unpopular nature. If, then, it is possible for a body of pioneers such as these to erect a fabric of national importance, it is worth the while of those interested in the co-operation of producers, not only to enlist their co-operation, but to learn how they achieved success. The principle exists, and is understood, but it is in the organisation and direction that failure is so possible.

We have seen that the principle of co-operation adopted by the co-operative stores is the reverse of that usually associated with the system by those who advocate its adoption by farmers. The one section of the public, and that a very large one, co-operates to buy; the other, it is often suggested, should co-operate to sell. Now, we would ask, whether it is not within the bounds of reason to suggest that if those interested in British farming, landlords and tenants alike, agreed to buy from, as well as to sell to, their own stores, they might ensure success. There are already a number of organisations through the medium of which farmers, being shareholders, can obtain their own manures, feeding-stuffs, and seeds; these are co-operative in every sense of the word. No manure or cake manufacturer, seed-grower or agricultural implement maker, no tradesman or merchant of any kind can afford to ignore the business offered by such concerns, and as a consequence the members are enabled to obtain the goods they require at first hand, often saving a considerable sum per annum.

So far, however, farmers as a body have preferred to buy for themselves direct, and consequently pay higher prices. The articles we have mentioned are necessary to every farmer, almost every landowner, and they represent large sums of money, but there are other articles which, appertaining to the household, are equally necessary, and which being daily requirements also entail considerable annual outlay. If the produce of a farm consists chiefly of wheat, oats, barley, meat, and dairy goods, it is equally certain that among the requirements of every landowner's establishment, and the majority have town as well as country residences, are flour, meat, butter, cheese, and milk, to which we may add hay, straw, vegetables, and fruit, while the tenants themselves, however they may be self-supplied, almost invariably require to be supplied with flour and meat, and in very many cases with butter and cheese from other sources. Hundreds

of country producers already supply private families in London; there is no reason why produce should not be sent from a central store to customers both in London and the country. There is, however, an unknown quantity to reckon with. As regards London at least, the servants, whether of households, clubs, or hotels, appear to possess the power of veto. It might have been supposed that the whole West End, so immensely interested in the prospect of British agriculture, would have striven to support any scheme in which their sympathy with farmers would be practically shown; but we believe that Mr. Turnbull's scheme, although well supported by men of great influence, was abandoned chiefly on account of the opposition of servants. A tradesman opening a new business runs a considerable risk, he possibly commences without a single customer, and he has to trust entirely to energy, good materials and time to build up a connection. A store, however, opened with a hundred heads of establishments, all of whom undertake to obtain from it such produce as it is in a position to supply, may practically start with its expenses covered.

That it is possible to look to the great consuming public in London as one anxious to support the British farmer, and willing to pay him well for his produce, with any degree of satisfaction we do not for a moment believe. The trade of the wealthier classes is not a cash trade. They prefer credit, with its corollary—tips to servants and high prices—to the simpler cash transaction and the British farmer. The middle classes have no more to spend than they know what to do with, and they cannot therefore afford to indulge national sentiments at the expense of higher prices for home-grown food. They, like the poorer million, are satisfied with American beef and New Zealand mutton, Danish butter and Yankee-made cheese, but they select the better qualities of these foods. If we look to the large consuming establishments we find no more comfort. In an interview with, perhaps, the leviathan caterer of London, we were told that business was not sentiment, and that a certain price being paid for a given food no inquiries were made whence it came so long as it was satisfactory. In another instance another large caterer declared that unless traders could supply him with home produce at as low a price as he was paying for foreign produce, he could not deal with them. Visitors to London patronising the most luxurious establishments and eating costly meals have at least the right to assume that the food they eat is the best and freshest in the market. On the contrary, however, a great deal is foreign and low-priced. It is not long since the House of Commons was shocked by the revelations made by those earnest and good friends of agri-

culture who are responsible for the success of the Margarine Bill. They will be surprised to hear that this ubiquitous food has since that day found its way into many refreshment rooms.

Let us next examine the present conditions of sale of farm produce, with a view to ascertain whether, in the event of a change of system being effected, the probabilities of a more successful result are worthy of attention. The farmer samples his wheat, and offers it to those merchants and millers from whom he anticipates the fairest offers. He effects a sale at a given weight, say 63 lbs. per bushel, perhaps 2 lbs. per bushel more than his wheat weighs. He delivers, and receives his cheque within the fortnight. Would it be possible under any system of co-operation for a wheat-grower to realize so quickly, and, if so, would the game be worth the candle? The only possible course would be to convert the wheat into flour either for sale to the baking trade or for direct conversion into bread. As the value of wheat would be as well known to the expert at the head-quarters of the movement as it would to the corn merchant or miller, it would be quite as easy to fix a price; but whether such price would be more or less than could be obtained in the open market is a matter which experience alone could decide. Wheat then might be bought and paid for under one system as rapidly as under another, but it is evident that if the purchase of wheat became part of the system of trade in a co-operative organization, it would be necessary to prepare for a huge business in the sale of flour, whether the more complicated trade of baking were added or not. Various opinions have been expressed with regard to the profitable nature of bread-making, and we therefore give some data which will be found of general interest, bearing as it does upon this material point. Some years ago the writer made an enquiry into the cost of bread-production, and he found that in grinding a quarter of wheat weighing the round number of 500 lbs., the following quantity of offal was produced in addition to the 380 lbs. of flour, viz. 26 lbs. of bran, 50 bs. of pollard, and 34 lbs. of sharps, which offal was then valued at 5*s.* 2*d.* The value now would be decidedly higher, as bran alone has been selling at 5*l.* 10*s.* per ton in the country. At that time flour was 2*s.* a peck, or 40*s.* a sack, as retailed by country bakers, although the top London price was 34*s.* To-day country bakers are charging 1*s.* 10*d.* the peck, or 36*s.* 8*d.* per sack, but excellent flour can be purchased direct from the mill at 28*s.* Upon the bases, then, of 40*s.* for flour, and 31*s.*, the then price of wheat, a quarter of wheat would realise 59*s.*, including the offal, which would more than cover the cost of grinding. Some experiments were made in the manufacture of bread, and it was found that ordinary loaves

made from 1½ lbs. of flour weighed 2¼ lbs., but especially crusty ones barely exceeded 2 lbs. 3 oz. The former weight gave about 105 loaves per sack of flour, a quantity which it is usually assumed that bakers strive to reach by the use of skilfully blended flours. At a price of 4½*d.* per loaf, the flour returned 39*s.* 4½*d.*, or very nearly as much as it was retailed by the peck. Here then we have figures which suggest how, by manipulation in the hands of a growers' organization, wheat would make a very much larger return to the farmer. At the time at which we write, while it is difficult to obtain a penny more than 32*s.* for wheat, bread is 5*d.* per loaf, so that the gross return would be still greater. There is, however, this difficulty to face, that bread made entirely from English flour does not produce more than about 95 loaves per sack, a difference which the public would not recognize by paying a higher price, as they might be fairly asked to do in consequence of the greater feeding value of each loaf. A well-known expert, writing on the subject of foreign flour, says that when mixed with British to the extent of three-fourths, from 100 to 105 loaves are produced, but only from 90 to 94 when there is no such admixture. A few years ago the Highland Society made some investigations upon the prices of wheat and its products, when it was ascertained on the average of five sources that a quarter of wheat produced 359 lbs. of flour, a quantity sufficient to make 119 loaves of 4 lbs. each, and that, as the offal covered the expense of milling, the flour required for each 4 lb. loaf cost 3*d.* In this case the number of loaves made per sack would be within a fraction of 93. In spite of the apparently high bakers' profits which the above figures show, we are not disposed to think that wheat will ever form an item of any importance in the trade of any combination of growers, unless it be for sale as raw material. Nor does barley present any more attractive features; indeed, so intimately connected is it with the great interest which absorbs all the best barley we grow, that it is quite unnecessary to discuss its sale in any but its primitive form. With regard to oats, there is no such restraining force, and it is doubtful whether any article of farm produce is better adapted for sale in a large centre of population at first hand. Country prices are much too often below value, but large breeders appreciate the superiority of English oats over Fins, Russians, and the like. Winter oats, for example, will always sell better in small than in large lots, and those who are willing to buy them are legion—owners of hunters, jobmasters, large brewing, trading and carrying concerns, and all who keep carriage-horses and other cattle of high quality.

In dealing with the farmer's method of disposing of the meat

he produces, we have to remember that all who keep cattle, sheep, and pigs, are not necessarily producers of marketable meat. Many breed and sell their young stock for others to graze off or finish. Dairy farmers frequently sell their calves and cast-off cows only; flockmasters not uncommonly leave feeding for the butcher to those to whom they sell, while it often appears that pig meat is produced in great abundance by persons who do not farm at all. At the present time the great bulk of the best fat stock is sold in the country either by market auction, in the market or fair, or direct to the butcher. The one drawback to the system is the absence of any definite standard of valuation, for the weighbridge is not generally accepted. When it is utilized as the one medium, and the method of calculation upon its basis better understood, the probability of there being any appeal for co-operation in connection with meat production and direct sale to the consumer will be very small indeed. Some excellent practical experiments have been made in the estimation of the carcase-weights of cattle by practical farmers, such estimates being subsequently tested by the weighbridge; there have also been auction tests, and tests as between farmer and butcher, with the result that in almost every instance the farmer has been on the wrong side. Just, too, as losses occur through ignorance of the weight of cattle, so do they occur through shrinkage in weight. Some years ago some leading Frenchmen visited one of our principal Fat-stock Shows. They carefully scrutinized the Pig section, and remarked to the officials that they did not at all admire the short-legged overfatted type which was represented so well. They described the country pig of France as being much more useful, and the reason advanced in chief was that, being long and lean, by comparison, it could walk to market; a very important consideration to the small farmers, who, living many miles from a market town, had no conveyance in which to carry it. The fact that such a waste of energy meant a corresponding loss of weight did not appear to strike the French critic. It has been estimated that animals despatched from Scotland to London often lose 5 per cent. of their weight. If, however, the loss per head on fat cattle reaches 1*l.* per head, it is sufficiently serious, and such a loss must be taken into account whenever the relative returns as between town and country markets are considered. Taking into consideration the difficulties in the way of the profitable utilization of the "fifth quarter" of the bullock slaughtered in the country, and of the direct sale of meat to the town consumer, we do not perceive any method which can be adopted, even under the system of co-operation, for the purpose of superseding the present system.

The sale of Dairy produce is a subject which has frequently been discussed, but of late the result arrived at has been very much the same. The cheese-maker is told that he cannot sell with advantage, because the quality of his goods is not high enough; the butter-maker is told that the article he manufactures is not so uniform as that made in France and Denmark, and that it is squeezed out of the market in consequence; the milk-producer is told that milk-production for sale is being overdone, and that in the summer months in particular the market is glutted; while the egg-producer is reminded that he does not understand his business, and that it is entirely out of the question to pretend to compete with the farmers of the Continent. In the first place let us enquire what are the sources of disposal open to the cheese-maker? Those most approved by experience are the factor, the town merchant, and the market or fair. In each case a bargain is made, unless by special arrangement, between buyer and seller. Practically speaking, the only buyers are the factor and the merchant; whether the transaction takes place at the farm or factory, the merchant's house of business or the fair. Cheese is usually made upon too large a scale for sales to retailers to become general; whereas retail sales of such cheeses as Cheddar and Cheshire, the two principal makes, and even Derbys, Leicesters and Gloucesters, are practically impossible. Retailers prefer to go to a warehouse where they can select from a large stock, a very natural preference. Their choice is not confined to one nor to half-a-dozen dairies; thus if Cheddar, for example, is required, the merchant can show his customer Scotch and Somersets, Americans, Canadians and New Zealands, and this fact alone is a great argument in his favour. At a store owned by British makers, the makes even of home cheese would probably be limited, while Colonials and Americans would necessarily be conspicuous by their absence. We are acquainted with one or two instances in which makers of cheese own town retail businesses; but, although cheese is consequently sold by retail, the great bulk is invariably sold to dealers who distribute it to their various wholesale customers. Makers of Stilton cheese are in a better position as regards the consumer, the smaller size of their cheeses, and the fact that it is not the practice to cut them, enabling them to sell large numbers direct. At Christmas time, in particular, Stilton makers fill large numbers of orders, some of which are those of merchants and tradesmen who make a practice of distributing a large number of presents at that period of the year. Although we are bound to admit that a wholesale cheese store supplied by makers might become both popular and successful, yet there is no

reason to suppose that makers in general will be able to find any system which will supplant that now existing.

The sale of butter may be regarded from a different point of view. There are two methods of sale open to the British producer; the one by retail to the consumer, the other wholesale to the consumer and the trade. Our experience of British butter as compared with the butters of other countries, as we have found it in the markets and dairies of those countries and in our own markets, is that it is too varied in quality, although the best is not excelled. Our makers certainly have every advantage; the best cattle which exist, pastures of the highest type, and markets at their very doors: whereas the foreign maker has the disadvantage that he is far from us both in point of time and distance, that he is compelled to salt heavily on the one hand or blend on the other, under which circumstances it cannot be expected that he should excel. We have, notwithstanding all these advantages in our favour, lost the trade in the giant market of the world. The reason is not far to seek. A great deal has been said about the superior skill of our antagonists and their greater business aptitude. We have been among them on many occasions, we know many of their leading spirits, and we are therefore not willing to deny the truth of these assertions; but they tell only half of the truth. It is a question of price. In some parts of the United Kingdom it is possible to make butter at even Danish prices; in most parts it is not, and it is the fact that to compete with the foreign producer the home farmer must be content with from 4*d.* to 5*d.* per gallon for his milk, which prevents him combining and carrying out the system which these people adopt. There is room for the sale of a certain amount of first-rate fresh butter direct to the consumer. Many farmers conduct such a trade, either delivering in their own neighbourhood, or despatching weekly parcels by post and train. Others sell their butter at excellent prices direct to retail traders; but the bulk of our makers are unable, and will to some extent continue to be unable, to find such a market. To such people two courses are open, the factory or creamery, or the blending house. The factory system removes all the milk from the farm, with its acknowledged manurial value of at least 1*l.* per cow per annum; the creamery system returns but a moderate price for the butter made and sold; while the blending system leaves the skim and butter-milk on the farm, producing, as a natural sequence of the operation of blending, a butter, the quality of which is inferior to that made at the farm where the best system is in force. If it is possible for foreigners to sell their butter in shops of their own opened in towns throughout this country, it seems *primâ*

facie equally possible for our own people to succeed by the adoption of a similar plan, but providing a better article for a superior class of customers. The two factors in the business—and it is probable that it might succeed in a wholesale as well as in a retail direction—would be the cold store and the blending machine, in order that butter of never-varying types might be produced for sale, and that these being mild, as British butter ought to be, there should be no loss of quality from exposure to high temperature. There is, however, a limit to the sale of such butters as we speak of, in consequence of the limited number of persons who will give the price, and as it is by no means certain that prices of foreign, and especially of Colonial butters, will not be considerably lower in the near future—for we shall assuredly soon be immersed in a New Zealand trade which time may develop into one of vast magnitude—the subject should be weighed with the greatest possible care before any attempt is made to bring it to a practical conclusion.

With regard to the sale of milk, the dairy farmer has the satisfaction of knowing that he is at present master of the field. Propositions have been made to import milk from Holland; but in view of the risk and of the predilection of consumers for absolutely new milk, we do not think that the conditions for the conduct of such a trade are perfect, whether from a scientific or social point of view. When it is absolutely certain that milk can be imported and delivered in a condition identical with that of English milk, and when the consumer has passed through another phase of the social evolution which is in progress, the dairy farmer will have to deal with a new problem. At present he is safe, and his new-milk market is his own. The great butter-making countries have a surplus of skimmed milk; the French give it largely to calves, even in its sour and coagulated conditions; the Danes feed pigs, their pork and bacon flooding the markets of this country in increasing quantities, and largely assisting in the reduction of the prices farmers have been in the habit of receiving for swine. Still there is apparently not sufficient profit in these occupations to induce their extension, and it is therefore proposed to convert the solids of skimmed milk into a material resembling horn or bone for general use as buttons, and in other ways which may suggest themselves. The milk industry in this country is enormous in its scope, but no data exists which would enable us to state with anything like accuracy how much is sold direct to the consumer. However, estimating that on the average the 3,956,220 cows and heifers of the 1890 Census yield 450 gallons per head, we get as a result 1,780,299,000 gallons, worth at 6½*d.* a gallon,

48,216,431*l.* Of this quantity it is possible that 600,000,000 gallons are consumed in the liquid form, for which 40,000,000*l.* is paid by the consumer, a sum which, according to Mr. James Howard's 1887 estimate, is in excess of that paid to the farmer for all the corn he grows, or all the beef he produces. The sale of milk, in fact, places the value of dairy produce second only to the produce of meat among the products of the farm. The farmer then has an enormous interest at stake which is worth preserving, although he probably does not obtain on the average more than one half of the sum for which his milk is retailed, excepting in such instances as he produces milk of exceptional quality. It is this disparity in price which has so often been a bone of contention between buyer and seller, for the public have little or nothing to say in the matter, accepting an inferior article readily enough so long as it is sweet and cheap, thus materially damaging the interests of the producer and of the better class of the trade. It does even on casual examination seem ridiculous that milk should be purchased at 6½*d.* a gallon, as it frequently is in summer, and retailed at 16*d.*; but in the first place we have to remember that such low prices for the warm six months are supplemented by an advance which frequently rises as high as 11*d.* a gallon for the winter six months. Dealers too are often obliged to pay fancy prices when milk is scarce in November and December, and we have known 25*s.* a churn of 18 gallons paid for it when contracts have had to be maintained and farmers' supplies have suddenly decreased. There is probably no business in which the expense of handling is so great. There is, first of all, the delivery from the milk cooler to the station; the cost of railway carriage—from ½*d.* to 2*d.* a gallon—a charge out of all proportion to the value of the goods, although the companies are striving to increase it; the purchaser's van to receive it; testing and measurement on arrival; classification; possible analysis; distribution among retail carriers, who carry it from door to door, delivering in quantities from one half-pennyworth upwards; booking, checking the carriers, a second booking at the dairy, rectification of errors and complaints, especially in hot weather when milk will not keep an hour in many of the dirty vessels in which servants and others place it; collection of accounts; cleansing and returning churns by rail; the daily cleansing of milk vessels; horses, vans and perambulators; and finally the large percentage of losses, especially of small sums, which occur. It is true that a few large concerns have paid their shareholders good interest—some private businesses have also paid well—but in every class of trade there are cases of this kind, from the wholesale co-operative society downwards. The milk trade

does not provide any greater facilities for acquiring wealth than any other trade, indeed from the limited variety of the goods sold, the fact that so many consumers believe all milk to be alike, and the fact that a new trader can only hope to acquire custom by elbowing out some other trader, it is evident that it is not so excellent a medium for making a fortune as many other businesses which require less capital and patience, and no more intelligence. We do not for a moment suggest that by co-operation farmers cannot succeed in obtaining slightly higher prices for the milk they produce; but while we admit this much, especially accentuating our belief that the increased profits would be only slight, we are bound to express our additional belief that the chances of failure are much greater than those of success. Farmers are not exactly fitted to deal with the London milk-carrier. One of the largest London traders once told us that his men were all obtained from the country, but that, although honest at first, they became dishonest upon the average in eight months. Indeed, honest shopmen and milkmen seem to be articles of *vertù*, prized when found, and taken every care of. Amateurism is therefore impossible in this apparently simple business, in which even the farmer who invokes the acquaintance of Mr. Simpson is but a sucking babe beside the persistent rascals who proceed to systematically rob the milk dealer who is not alive to the necessities of every hour of the day. Among these we may include "long firms," small shopkeepers, and private customers, who never practise payment, and who go from dealer to dealer seeking all the milk they can devour. We remember one instance in which one of these people, who subsequently received eighteen months' hard labour, for which he has in the main to thank the writer, obtained milk wholesale from no less than thirty-seven farmers and firms in all parts of London and the country. It was generally taken direct from the station at midnight, and sold by the churn within the next hour at less than cost price. There is always a percentage of customers, both wholesale and retail, which make bad debts. Small shopkeepers and dairymen seek to add to their incomes or to create a special trade. If they succeed, they pay their way; if not, they vanish, and the balance is practically lost; while good money, which may be spent in the endeavour to bring them to book, is lost with it. Private customers, too, have a persistent knack of cheating the milkman; lodging-house keepers and persons forming a large section of the London community, who with large promises and small payments manage to creep into the traders' books, and when further credit is impossible, quietly remove their goods and chattels to some remote part of the great metropolis, where

the trader ceases troubling and the debtor is at rest. Under certain conditions the milk business can scarcely fail to pay fairly well; yet again, under general conditions, there is absolutely no certainty about it, except in the cases of established businesses managed by expert and competent traders. In the month of April it has happened that farmers have walked London over and failed to sell their summer's supply at 6½*d.* the imperial gallon. Buyers can generally obtain much more than they require at this time of the year; but when July and August arrive, the supply diminishes, and milk has to be sought. Again, the buyer in April can usually contract for the entire year; under such circumstances his winter price is sometimes very favourable, inasmuch as the producer is only too glad to make a contract at all, and to make sure of the sale of an article which he is obtaining daily in large quantities, which is perishable, and which he has not the convenience for converting into cheese or butter even were he willing to do so. The winter season arrives with October, when milk is already scarce by comparison with April. The winter dairyman, perhaps a summer cheese-maker, obtains a higher figure than the contractor for a year, but his milk does not permanently prevent a rise, and gradually the scarcity increases until contractors who have bought freely increase their advantage and easily make up for any unprofitable sales which had been effected when their supply had been excessive in April, May and June. We have looked at both sides of the picture as candidly as possible, and while admitting our belief that a successful milk trade can be conducted, yet we feel assured that any attempt is doomed to failure unless it is absolutely and entirely managed by men who are past masters of the craft.

The trade in cream is not sufficiently large to be treated as a distinct business; it is, in fact, but a branch of the business of the general dairymen. There are, however, many milk-producers who deal in nothing or next to nothing but cream. The competitions at the London Dairy Show have displayed what trouble and pains various companies and other traders have taken to make a feature of thick raw cream in the now well-known earthenware jars. The first cream of this kind which was submitted to the writer was thickened with gelatine; frantic efforts were next made to obtain it direct from the separator, and it was finally found that comparatively thin separated cream thickened in the jars under given conditions which were simple, and which provided all that was necessary. Most of this cream is produced in the country, but much is separated in London, although the difficulty of disposing of the skim-milk handicaps the Londoner considerably. That any appre-

ciable quantity could be retailed by any one establishment we do not believe. To sell it wholesale would require the employment of the cold store to which reference has been made; but even then a custom which is now common among those who deal in fancy dairy goods would have to be followed—introduction to traders by travellers who daily visit different London districts, carrying their goods with them and delivering on the spot.

Success in egg-dealing is not impossible, but it is highly improbable. Retail sales are hardly worthy of attention, when confined to one organization, and wholesale sales are in our judgment out of the question. The reasons are not far to seek. During nine months of the year the best foreign eggs are practically equal to English, and are to a very large extent sold at "new-laid" prices, if not actually as new-laid eggs. During the remaining three months, English eggs are so scarce that the quantities at the disposal of farmers are not worth the attention of the wholesale buyer. Competition in the egg market is very keen, for in addition to French eggs we receive large quantities of Danish, Italians, and Austrians, and now Canadians are to be added to the sorrows of the British egg-farmer. We are afraid that producers will still find it necessary to send the weekly basket to the grocer in the market town, or to sell in the market-house, where such exists, direct to materfamilias.

Poultry breeding has never formed an important feature in the system of the British farmer, unless it be for home consumption, nor do we believe that it will. It is extremely easy to keep a dozen hens in a suburban garden, and by feeding them upon the refuse food of a large establishment to show that they return a profit of fifty or a hundred per cent. It is also easy to show (on paper) that if twelve hens, thus kept by an amateur, paid the munificent sum of 10*s.* per head per annum, the produce being valued at retail prices, five hundred hens must *pro ratâ* pay a profit of 250*l.* per annum. The poultry farming mania has been exploded, and no sane person who knows anything whatever about practical poultry keeping would dream of attempting to conduct a business in the production of eggs and chickens for table on a large scale, especially if he had to purchase the food for their consumption. Farmers have as a body been too wise to be attracted by so stupid a bait. They keep sufficient hens to act as scavengers of the farmyard and the stubbles, and to consume such tail corn as is not fit for grinding. Under given conditions the breeding of ducklings, and even turkeys, on a larger scale, will pay; but we are dealing with poultry as it applies to the farm, and this is not the place to enter into the merits or demerits of any system of

feeding or breeding.* In some cases a point is made of rearing a few score chickens for sale, in others a flock of geese is reared, and in others again turkeys are chosen. Whatever the birds may be, their number is not likely to be sufficient to be worthy of connection as a department of a co-operative system, inasmuch as not one farmer in six would in all probability be able to supply an order at a day's or perhaps a week's notice. The hens of the farm are too motley a crew to produce chickens suitable for a first-class market, and no other would be of any value. They are either coarse in quality, yellow or dark in skin, orange, blue, or black in the leg, feathered on the toes, or chiefly composed of bone and offal. The best poultry come from particular districts, they are largely selected by higglers and fatted by experts. Farmers' fowls seldom go to the great markets at all; if, however, they do occasionally venture, a second visit is not often attempted.

What are the plans adopted by the vegetable and fruit grower? They are various, and we can therefore only refer to what we have actually seen in practice. Some farmers will have nothing to do with salesmen on the usual principle of "consignment,' and take what you can get." They get the buyer down to the farm, and sell to him by the acre, or even by the ton at a given price, affording him every facility for ascertaining the quality and the yield. We remember to have been present in one instance in which an offer of 1000*l.* was made and refused for a lot of potatoes as they stood in the clamp, although we believe a bargain was eventually struck. We cannot conceive of the grower in question despatching such a valuable lot to London and leaving himself in the hands of the salesman. As an example of what occurs, let us refer to a type of many transactions. The grower takes a few samples of potatoes and calls upon salesmen; he leaves them with a selected salesman in order that they may be cooked as a test of their value. In a day or two he receives a note in which he is perhaps told that such and such varieties cook badly; but that a ton may be sent on as a sample or trial lot. Perhaps, however, a price is quoted, which it is suggested he may realize. He sets to work, and the lot is sent. It may happen that if several varieties are grown, a ton of each is sent. In course of time he receives a letter, in which there is some complaint of the quality or the size, together with an account and a cheque. The latter is so small in amount that his heart leaps into his mouth. He hastily glances over the account and finds that the sale was effected at a figure far less than that suggested by the salesman; then follow deductions for

* See Note-Book, p. 244.

short weight, commission and carriage; the balance being less than the actual cost of cultivation. We have frequently heard of excellent prices being made by dealing with salesmen outright on the farm, but never when the transaction has been conducted on the consignment principle, although, of course, there may be instances where good prices have been so obtained. In times past the press has teemed with complaints. Let us recall one of a case, the whole details of which we were intimately acquainted with. A quotation was given for mangolds, it exceeded 20*s.* a ton delivered. At considerable expense the grower, who was preparing a large field for grass, with the help of a staff of labourers, cleaned every root, and selected only the finest, which were carted to the station, and despatched in well-covered trucks to London. When all had been sent, an account was obtained, showing that the net sum due to the farmer was four shillings and some pence per ton. Complaints resulted in insult, and threats of legal action in ridicule. A large and successful fruit-grower has frequently told us that fruit he has consigned for sale has been paid for at about one quarter the amount they publicly price it at. His difficulty, however, is that he cannot swear to the fruit, although he personally knows it to be his. Mr. Lawry, the successful Cornish farmer and fruit-grower, told us that when he commenced business in fruit, he followed his first consignment to London by the mail, and was in the crowd in the market early the following morning, when it was sold. He saw it knocked down, and knowing the prices realized, subsequently made himself known to the salesman. The same gentleman relates how having been cheated by a salesman, he brought him to book by an action to which this case was fortunately open. If it is necessary to consign to a salesman, the only plan is to ascertain from intimate friends or men of known reliability to whom to consign. Salesmen are not all alike, and the best firms take a pride in doing the best for their clients in every sense of the word. This is particularly the case among hay and straw salesmen, some of whom are excellent friends of the farmer. In this business the plan of sending up trucks of hay as samples which so many strangers ask for should not be followed, unless a quotation is given upon the basis of a sample truss. In Smithfield it is the duty of the salesman to enter every sale he effects in a market book, which can be (or could be) examined upon payment of a penny. We once searched this book for details of the sales of several trucks of hay which had been consigned to a firm. No entry had been made. Explanation was demanded, when it was admitted that the hay had been delivered from the station direct to customers—thus evading market dues and market responsi-

bilities, for of course it was impossible to learn what prices had been made and to whom the sales had been effected. Hay from the same bulk had realized 83*s.* in Whitechapel Market —the price was then high—more was promised by the Smithfield salesman—who receiving the sample truck reported it satisfactory, at the same time asking for the remainder, which was promptly sent. In the course of some eight weeks an account was extracted—the sum paid being at the rate of 50*s.* Here again the salesman laughed the farmer to scorn when a complaint was made. Under the heads of vegetables, fruit, hay, and straw, although we are unable to see how an ordinary retail trade could be conducted as it is usually understood—we conceive that the suggestion made in connection with railway markets might apply. If, however, we take for granted that the companies would supply the accommodation, the initial difficulty has still to be met, the supply of organizers, administrators, and other experts necessary for the successful conduct of business.

The prospects of success then do not on the whole appear sufficiently satisfactory to warrant any new departure. If we except the dairy trade, we know of no existing business with which farmers are connected, and which might therefore throw light upon future possibilities. Other departments have been tried in one or two instances, but from causes already explained they have been given up. Co-operation seems to apply fitly enough to every class of our population, with the exception of that which derives its income from the soil. Inasmuch, therefore, as the great bulk of our consuming public buying in the cheapest market necessarily selects a very large proportion of foreign produce, and as farmers can only offer produce grown upon their own farms and sold in comparatively small quantities in large centres of population, it does not appear that they will improve their position by attempting any general system of co-operation for the sale of their goods by retail. To this opinion we are driven by facts which appear irresistible.

IX.—*Fruit-Growing for Farmers.* By C. F. Walsh, Editor of the 'Horticultural Times.'

I HAD occasion this last summer to traverse several times a part of the country where I saw neglected farms seeding themselves down to weeds. On the 6th of November the highest price I saw quoted in London for wheat was under 36*s.* a quarter. On the same day there was sent to me from Oxfordshire a box containing some grapes, grown on a cheap system, which

had been fetching 1*s.* 6*d.* and sometimes 2*s.* a lb., and some *Blenheim Orange* apples, very fair samples but nothing out of the common, which were then selling for 8*s.* a bushel on the spot. These were from mature trees, the ordinary trees of the district, carrying this year fifteen to twenty bushels of apples each.

It is, I think, little wonder that there should be manifested, on the part of those who have turned their attention to the problem of making our agricultural population more prosperous, a strong desire to ascertain whether the English farmer cannot improve his position by giving at least a portion of his time and attention to the cultivation of fruit for market. My occupation for some time past has given me exceptional opportunities of forming an opinion on this point.

DOES FRUIT-GROWING PAY?

Perhaps, before we proceed to see what it is in the power of an ordinary farmer to do, a few words upon this question would not be wasted; for, strange as it may seem to many with whom I am more habitually brought into contact, there are not wanting plenty of people who continue to assert that it does not, and will give chapter and verse for their contention.

I do not now propose to deal at any length with this extremely vague and comprehensive question. To go fully into it would alone require a long essay, and would be beside the purpose of these present few remarks, which are merely intended to suggest to farmers some considerations that might induce them to add some fruit-growing to their more ordinary operations. Further than that I need only point to the fact that the area of land under vegetables and fruit is increasing, and most rapidly in those districts—Bedfordshire and Kent—where market-gardening and fruit-farming are already specialties; that is, that the increase in acreage under vegetables and fruit takes place most rapidly just where the people have the most reason to know what they are about. Statistics as to the profit and loss of any private business that is prosperous are not, as a rule, easy to get, but perhaps some of those who may read this saw the prospectus that was issued some months ago when it was proposed to turn into a company the fruit-farming and jam-making business of Mr. Thomas Wood, of Crockenhill, Kent. I do not recollect what the profits were stated to be, nor do I know whether the accountant's estimate was right, but I do know something of the magnitude of Mr. Wood's business, in which he employs some forty steam-engines and sixty horses; and this is the creation of less than his own business lifetime, for he did not begin as a fruit-farmer but as an engineer. It will scarcely

be contended that Mr. Wood's business has grown to its present size because it did not pay him. I may give another instance of quite a different kind—Lord Sudeley's 500 acre fruit-farm at Toddington. This is a very strong case. It is not a case where the industry has gradually grown from small beginnings, where every little step has been tested and proved, and everything found unsatisfactory (as perhaps not being suited to the conditions) discarded as experience was gradually gained; but an experiment of a fruit-farm started *ab initio* on a great scale, where mistakes, if they were made, would presumably be on a great scale also; and though the expenses were, and are, of course, very great, and though it will be some few years yet before the trees are in anything like full bearing, I have Lord Sudeley's authority for stating that he has already come to the conclusion that fruit-growing on a large scale will pay those who can afford to wait. I shall only notice under this head, further, a paper read by Mr. C. De Laune Faunce De Laune, of Sharsted Court, Sittingbourne, at a meeting of the Farmers' Club in 1889. Mr. De Laune is Chairman of the Committee of a large and important association of Kent fruit-growers, and he stated that they had amongst them 1760 acres of fruit trees, *and would soon have nearer* 3000. Mr. De Laune himself did certainly not appear to be an enthusiast, and had a great deal to say about the risks attending the business, but there is no getting away from the significance of these figures.

Let us now glance for a moment at the

PRESENT CONDITION OF FARM ORCHARDS.

In most cases the condition of the old orchards attached to farmhouses is deplorable, and in these latter days farmers have had a good deal of lecturing on the subject, some of which they have deserved, but not quite all. For it is too often overlooked that many of the existing farm orchards were planted to meet a different state of things from that we are confronted with to-day. When they were planted railways had not reached the rural districts, and orchards were not planted with a view to sending the fruit to market to some great town fifty or one hundred miles off, but for the purpose of supplying the wants of the farm in the way of fruit and cider—a very different thing. Beer has been driving out cider, and few farmers seem to have cared enough about the rest of the crop to give the trees a fair chance. Wheat paid to grow in those days; and now that the farmer, in his desperate attempts to find something that will pay, casts his eye where he ought long ago to have cast nanure and attention—on his orchard—he sees blanks where

some trees have died and rotted away, other trees storm-beaten and half dead; others that have chanced to be of a more vigorous constitution or better suited to the locality have outgrown and overreached everything else, but their heads are matted and they are covered with lichen from the ground to the topmost twig. Now how to deal with an orchard in this state must depend to a great extent on the circumstances of each particular case, and what the farmer wants. I can here only summarise and speak generally. First obtain if possible the advice of some one, gardener or nurseryman, who has had experience in the same or a similar soil and neighbourhood, in the renovation of old orchards. His principal value will be in advising which trees are past praying for and must go to the woodshed, in selecting sorts known to do well in the neighbourhood, and in deciding as to the cutting back and grafting, or merely pruning, of the trees that are spared. Grafting must be learned, and had better be done by a gardener. Pruning will consist, as to the old trees, in cutting away superfluous and injurious wood, that is, matted and entangled branches which injure other and better ones by excluding light and air. The branches that are removed should be cut off clean, leaving no stumps, or in a few years the previous undesirable condition may be reproduced in an aggravated form.

The principal disease that trees such as I am speaking of now have been suffering from is starvation. In many an orchard, year after year, it has been the practice to take all the grass and fruit that can be got, and put nothing back. The old trees that are to be left will have long straggling roots, which have been going nobody knows where to look for food, instead of there being the bushy mass of fibrous roots which there should be for good fruit-production. Dig a trench round each of these trees at six feet from the stem and deeper than the roots go, cutting off every root that is found, as clean as possible. Then fill in the trench again and put a good mulch of manure over the space the trench encloses. That will encourage roots of the kind wanted, and where they are wanted—close to the tree, where they can be fed without waste of manure. Some time during the winter, when the trees are quite dormant, mix lime and boiling water till the mixture will go through a fine sieve, and squirt all over the branches at a temperature of 90° Fahr. That will settle all the lichen as well as a variety of objectionable things that find shelter in it. Never plant the same fruit again where a tree has been removed; if an apple or a pear have been taken away, plant a plum, and *vice versâ*. Thenceforward give all available pigs, sheep, and poultry, the run of the orchard, and if possible feed them there. No parti-

cular science or skill is required for any of these operations, nor has expensive material to be bought; but if any tenant of a starved and neglected orchard of the usual (I am sorry to say) farmhouse type do as I advise, he will not be the person least surprised at the result. I have no doubt that many people who might have the choice, were they going into fruit-growing, of taking over and renovating an old orchard or of planting a new one, would choose the latter. Very likely they would be right, but I must take things as I find them, and the farmers whom I hope to interest have their orchards already. They have only neglected them. There is another reason why I wish to see the renovation of our old farm orchards taken in hand, and that is that I think few things would give such a stimulus towards the planting of an increased breadth of land with fruit as the actual demonstration, under and by farmer's own hands, that the unsatisfactory state of their old orchards was mainly owing to the absence of any proper and sensible treatment. I cannot doubt that the present state of things has a deterrent effect on enterprise. The present generation of farmers have too often never seen on their own ground anything better than unhealthy and unsatisfactory trees, and a natural result is to dishearten them, and lead them to fear they can do no better. This is in nearly all cases quite a mistake. There is hardly any land in this country worth cultivating as ordinary farm land which will not grow *some* kind of hardy fruit; and grow it well. There is an immense deal of misconception on this point. Kent is unquestionably the leading fruit county, but other things besides soil and climate have combined to that end, and one of the most experienced gardeners I have ever known makes no bones about saying that the superior quality of the *men* of Kent has not been the least potent factor towards achieving that result.

PLANTING NEW GROUND.

I opine that the persons for whose benefit I have been requested to put together these few remarks have no intention of setting aside a piece of ground for the most intensive fruit culture. According to statistics collected in West Kent, by Mr. Cecil H. Hooper, of the Swanley Horticultural College, and published by the Highland and Agricultural Society of Scotland, in a most interesting paper which has been republished by special permission in recent numbers of the "Horticultural Times," an outlay of 35*l.* an acre is required to prepare and stock the ground, and 20*l.* an acre annually thereafter to keep the cultivation going. For this, special skill is required, and so large an amount of labour and manure, that we

may dismiss anything of that kind from consideration here and now. Additional considerations have also assisted to convince me that it would be extremely unwise for the ordinary farmer to trouble himself at all about what are known as "soft and bush fruits." Apart from questions of the expense of cultivation in labour and manure, any one planting a large breadth of, say, strawberries, would be ruinously at the mercy of the market unless he had a jam factory of his own or one at hand which would take his fruit. Strawberries, raspberries, and red and white currants I consider absolutely barred. I would not entirely, however, set my face against black currants and gooseberries. They will bring in some return earlier than the apple, pear, plum, and perhaps cherry trees, which must be the farmer's main reliance, and they have peculiarities which recommend them to some consideration. Black currants will thrive in low, damp, and shady situations, disliked by most fruit; they do not require very much attention, and they always sell. Gooseberries have one great recommendation; they can be picked and sold green, any fruit left being all the better when ripe. The first green gooseberries in the market always fetch a good price. They are not expensive to cultivate; and if a farm be at all an "early" one, an investment in early and prolific sorts would often be a very profitable speculation.

But, as I have said, apples, pears, and plums must be the main reliance of the farmer. As no return can be expected from these fruits for some years, we are at once face to face with the question of tenure, but I prefer to say a few words as to that later, merely taking it for granted in the meantime that the farmer, if not a freeholder, is able to make some arrangement in that matter satisfactory to himself, as without some such arrangement he will not plant fruit trees at all.

First I advise him to begin in a modest way, and not to begin at all till he has thoroughly studied his situation as to soil, climate, accessibility of markets, and the particular tastes and demands of those markets. Quite as good prices, to say the least, are frequently got in neighbouring provincial markets as in the markets of the large towns, besides which one variety of fruit will sometimes sell well in a particular district when dealers in some other town will hardly look at it, and there are obvious advantages in dealing with a neighbour with whom one can be in constant touch. Therefore, I say, study your district markets. If anyone should doubt the necessity of urging attention to such a seemingly simple matter, I will only refer him to the remarks of Mr. T. F. Rivers recently at Brighton, where he pointed out that the whole county of Sussex did not supply that one town with the fruit it consumed,

which there was nothing in the soil or climate to prevent the county from growing.

APPLES.—As to what to plant, I say without hesitation, that whatever else he may plant, hardly any farmer can do wrong in planting apples. There seems absolutely no limit for the market for apples *if the sorts are right;* and at the rate the population is growing, and the taste for fruit spreading, I am quite at a loss to suggest any period, short of a very distant future, at which there is any chance of the supply overtaking the demand. As to the returns from established trees I need only say again, what I said in other words when I began this paper, that this autumn old trees of *Blenheim Orange* have each produced as much as an acre of wheat, and those trees had not had one hour's attention, beyond gathering the fruit, for years. Apples, again, have the great recommendation that a farmer can grow them with little either of skill or expense; but to get any such result as we have quoted, the planter must be able to wait, and I have specially and particularly mentioned this apple first for that very reason. Should the farmer own the freehold of his farm there is no one particular thing that he can do better than to plant this apple, a good way apart—not less than thirty feet,—and then let it alone, for of all apples it wants about the least pruning, and that only in its very early youth, to get a good shape. It will not begin to give any return worth mentioning for ten years, but it will then gradually increase till (as things are now) the produce of each tree will be worth an acre of wheat, and it will keep on bearing like that at least as long as the man that planted it is likely to live, and how much longer I should not like to say. Ten years seems a long time to wait for any return in the way of a crop, but it is a very important and a tolerably obvious consideration that the value of the freehold is increased from the moment of the planting, and goes on increasing for at least forty years. There is no reason, however, why a farmer should confine himself to such a slowly maturing tree as the variety quoted.

The *Keswick Codlin*, for instance, is a free and regular bearer, one of the most useful of kitchen apples, and in the way of early bearing stands just at the opposite end of the list, for it will begin to make some return in fruit after two years' old. Between these two extremes stand many other hardy prolific sorts; and should the farmer choose to deviate from the plan of planting standards on grass, and elect to give the protection of an enclosure from which cattle are entirely excluded, and the extra attention needed for proper development, he can plant the bush and dwarf form of trees which

come earlier to maturity, bearing in mind the law under which early maturity means a shorter prolific life. A very usual plan, of which common experience has proved the advantage, is to alternate the slowly maturing and long-lived standard form with the early maturing shorter-lived bush form, the latter being removed as they have served their turn and the standards increase in size and come into bearing. Every man must lay out his plans after full consideration of his own particular circumstances. It will be observed I do not give cut and dry lists of the best sorts to plant. Subject to certain general considerations, this should be matter of consultation with the nearest respectable nurseryman, who is certain to know what thrives best in the district. I take it, the great reliance of the farmer, who is not so much going into fruit-growing as a business, but who wants to improve his circumstances without risking such an investment of capital as would be contemplated by any one entering upon fruit-growing as a business, will be in the main on standard trees. Of these he should choose but few sorts—there is no greater mistake than having a small quantity of each of many varieties; they should be such regular and full croppers as are known to thrive in the district, and they should be rather of early and late than of mid-season varieties, as the latter come in when the markets are best supplied.

PEARS.—Some readers may be surprised to find that I have a very good word to say for pears in this connexion, for it has long been a sort of article of faith that only those people should plant pears, whose circumstances may induce them to plant for the benefit of their successors. In a general way this is no doubt true. Pears also require in the main so much more protection and care than apples, that a farmer may well hesitate before having anything to do with them, nor do I suggest any great outlay on them; but in many places, established standard pear-trees bear regularly and well; and where that is found to be the case, and specially if the variety be either early or late, I would always plant a few trees. They often live to a good old age, and good pears are *always* in demand, especially late varieties. Indeed, I know of few things in respect to which the demand is so constantly greater than the supply.

PLUMS.—This is somewhat another matter, for if the farmer wishes to go beyond apples in the first instance, the plum is the fruit most worthy of being grown along with them. As standards, plums give quicker returns than apples, but as a rule the trees will be done within about twenty years from planting. Early maturity would make plums a most valuable crop to the

farmer, were it not that they suffer from the two drawbacks of being more particular as to soil and from their early blooming more liable than apples to have all prospect of the crop destroyed by spring frosts. Given some lime in the soil, the first consideration is not so important to the farmer as the second; and if from its situation his farm is particularly liable to spring frosts, we hesitate to recommend him to plant any quantity of plums. Records of temperature alone are often misleading in this matter, it is a *damp* frost which is to be feared, and the bottom of a valley is far more dangerous than a hill-side considerably above it. If the situation be fairly favourable, and the soil anything but a thin skin on the top of chalk, the farmer will find plum-trees well worth a trial, planting only a few sorts, and being governed for the most part by the same general considerations as in the case of apples. *Victoria* will be his main reliance; without being a plum of the very first class, it is good for dessert, good for the kitchen, a great bearer, and, for a plum, a very certain cropper. When no other plum in an orchard has a fruit on it, the *Victoria* will often have a crop. In addition to this, an early plum, such as *Rivers' Early Prolific*—very early (always an advantage), and a great cropper—and a later sort, such as the very handsome *Pond's Seedling*, are all that the farmer need have, with one possible exception, the *Greengage*. There are several varieties of gage, to suit different soils, which will be for the planter to consider—if one does not do in a particular place, perhaps another will; but, merely taking the common greengage, I would certainly plant it freely in places which are found to suit it. It is somewhat fastidious, but where it does succeed, I know not what better, from a business point of view, a man can plant. I will only add with regard to plums, that they are worth risking something for, because when put on the market in prime condition, they are quite unrivalled by any imported fruit of the same kind.

DAMSONS.—These are plums no doubt, but they are generally dealt with separately, and it is perhaps better to call attention to them separately also. Professional fruit growers know well their value. They are prolific, hardy, always sell, and form the best of shelters for other trees from the quickness and density of their growth. Whatever else a farmer plants, he should plant damsons. They sometimes "miss," certainly, but they give no trouble, grow fast, and are, taking one year with another, one of the most steadily profitable of fruits. The *Cluster* (*alias* the *Farleigh*) is the favourite sort.

CHERRIES.—Were it not for one thing, the cherry would be perhaps the best of all fruits for the farmer to plant. It is

surface rooting, and therefore specially suitable for orchards under grass, and for the same reason, though it likes a calcareous soil, and a strong deep loam, it will grow and bear very fair crops on a thin soil, unless the season be exceptionally dry. It is not a tree of early maturity, for it will not bring in much return till it is ten or twelve years old, but then it lasts long, and while it requires less attention as to culture than any other fruit tree, the crop of an established orchard, if it be a fair one, will not uncommonly fetch up to 40*l.* an acre by auction on the trees. The one difficulty with it is in saving the crop from birds, and hence the planting of cherry trees in a mixed orchard is no use. They are almost always planted in an orchard by themselves, and bird scaring boys employed during the season of ripening.

OTHER FRUITS.—The mulberry, the medlar, the quince, and the blackberry, are all fruits which might well receive more attention than they do. The first is so delicious a fruit that it is impossible not to believe there would be a large sale for it were it within the reach of the general fruit-eating public. It is very difficult to present in good condition, for when dead ripe it begins to spoil almost immediately. Should any one, however, be able to solve the packing difficulty so as to present it in something like the same condition in which it is eaten from the tree, I believe it would be found very profitable. The black mulberry is the best. The second, the medlar, is a very great favourite with those who do like it, and will do well wherever the apple, or the elm, thrives, and has the recommendation that it makes a very good preserve. The quince, in large and continual use as a stock for pears, is another fruit too much overlooked on its own merits. There are four well-known sorts, the pear-shaped, the Portugal, the mild or edible, and the orange or apple-shaped, but it is not everybody's tree, for it should have a soil both rich and moist. Those that do come to market are generally saleable at fair prices, and I know no sufficient reason why it should not be much used if it were more generally obtainable. The humble blackberry is not so humble that it need be despised. There is evidence that it was more an article of commerce fifty or sixty or more years ago than it has been most of the time since, possibly owing to the improved means of distributing other fruits; but I have heard a good deal this last season about the increasing supplies which find a market in London, and one small dealer told me the other day that he had cleared as much as 30s. a week by setting people to pick about the hedges for him, and then forwarding the fruit to market. It is, I have no doubt, the

very profusion with which a comparatively poor quality of this fruit is produced which has kept many people in ignorance of what a delicious fruit a really good blackberry is, and I decline to believe there would not be a ready sale for these finer samples. The cut-leaved bramble (*Rubus laciniatus*) bears very fine fruit, and is a most ornamental covering for fences and houses; and any farmer with a bit of boggy ground might turn it to good account by planting the American variety, *Wilson Junior*. The common wild berry is susceptible of great improvement, as any one will find who, having a bit of wood with blackberries underneath, will cut them down and give a good dressing of manure.

NUTS.—The walnut should be much more largely planted than it is on land that is farmed. Apart from the fact that the tree is extremely handsome, it bears crops that pay well for the land occupied; it is very valuable as timber should it become necessary to remove it; it is a very fine shade-tree for cattle, and it has further the peculiar recommendation that hardly any insect will have anything to do with it. There are many sorts—*Tender-shelled* and *High Flyers of Thetford* are two of the best. Filberts and cob-nuts are grown to some extent in Kent, mostly planted in alternate rows with apples and other fruit-trees. For the former *Lambert*, and for the latter the *Kentish*, are perhaps the best. Cobs may not fetch so high a price as filberts, but are generally preferred as being more certain croppers. They are both extremely profitable when they come into full cropping, but they require some observation and skill in pruning. The skill can be best obtained by one lesson of a few minutes, and the observation is required to see that no one, on any almanack considerations, is allowed to use a knife till the catkins have nearly done shedding their pollen.

SITE AND PLANTING.

I have attempted in these remarks to place some general considerations before the farmer without entering into any cultural details, which would be outside my present purpose; but I would most earnestly impress on any farmer who purposes planting, that he should give his trees the very best available soil and situation on his farm. The former is the most important. *The key to success in fruit-growing is* QUALITY. One bushel of apples at 10*s.* is worth more than two bushels at 5*s.*, if for no other consideration than that the labour and expenses of marketing are with the latter double; and the best and most even consignments of good fruit are always in demand, while

inferior and mixed samples are comparatively unsaleable. Soil is the more important consideration, for though it is a commonplace to recommend a south or south-western aspect, it is often with our hardy fruits a doubtful benefit. They may be ripe a week earlier than in other aspects; but then they will bloom so much the earlier, and the promise of a crop may be destroyed over a whole orchard by one night's frost, which the more tardy blossoms on the other side of the hill escaped. A week's earlier crop often has a great advantage in money value, but that may easily be more than counterbalanced by the increased risk of no crop at all. Therefore, let soil rather than aspect govern the choice of site.

As to the actual planting, the best thing a farmer not used to it can do is to let the nurseryman who supplies the trees, or some experienced gardener, do it for him in the first instance. What the farmer must attend to for himself is drainage. If the site be not naturally drained, it must be drained artificially, for there is hardly anything which will so completely bring the hopes of the planter to naught as a soil liable to get water-logged. Young fruit-trees are better without crude manure, and if the land be in good heart, better without manure at all; but drainage they *must* have. There is one other thing under this head which I find from experience to be neglected to a most surprising extent, that is, the staking of the trees. This may often be done fairly well when the trees are planted, but it gets woefully neglected afterwards in far too many cases. The trees should be regularly examined, to see that the bands are neither too tight nor too loose, and that the stakes are firm. A young tree which has as yet no hold of the ground cannot be swayed about by every wind without the breaking and injury of the young root-fibres which it is throwing out. Any tree which has been thrown out of position should be attended to and put right forthwith.

Protection from rabbits, hares, sheep, cows, and horses is absolutely necessary. The old triangular fence is perhaps as good a way as any against the larger animals. Various devices are in use against the others. Staves of old barrels twisted in rope, after a fashion that may be seen in some sunblinds, and tied round the trees, are not at all bad. Furze tied round is another dodge; but I prefer wire netting, A tolerably large mesh will be quite effective if pegged down away from the tree at the bottom and tied round the tree at a safe height, and it has not the disadvantages of most of the other things in the way of harbouring dirt and vermin.

GLASS.

There are many other things a farmer may do, and is indeed in a very favourable position to do, with regard to variations in cropping outside of or in conjunction with his ordinary work of rotation cropping, though, as they do not come under the head of fruit, I shall say nothing about them here; but there is one matter I cannot forbear from mentioning, and that is "glass." Many readers will be surprised, perhaps, for "glass" has generally been looked upon as the particular specialty of the highest and most intensive style of market-gardening; but I am convinced that in this direction there is an opening of some importance for the farmer. I have hitherto mentioned the kinds of fruit which a man already a farmer could grow at the least trouble and expense. It has been my object to suggest certain things which he might do and yet fall very far short of turning himself into a market gardener—it may very likely end like that with him, but that is a matter for him to decide when he shall have felt his way. To recommend glass will seem to some scarcely compatible with that point of view, but in reality the utilisation of glass-houses is just one of the things as to which the ordinary farmer possesses one great advantage over nearly all other possible competitors. He is a manure maker as well as a manure user, but he almost invariably wastes one of the most important virtues of what he does make—the heat of fermentation, to say nothing of a large quantity of ammonia. He is always making manure, but he is not always using it; and between the making and the using some of its qualities go to waste. The professional grower of market-produce under glass, working on a comparatively small area, has not the same reason as the farmer to require large quantities, so he falls back upon water and iron pipes for his heat. Perhaps comparatively few farmers in country districts have heard of professional mushroom-growers, using fresh stable-manure for mushroom-growing as long as the heat of fermentation lasts, and then passing it on to the farmer for the value of its other qualities. Is there not a valuable hint here for the farmer himself as to utilising what he now absolutely wastes? There is nothing new in this system, as to many other things besides mushrooms, though it may open a vista of new possibilities to the ordinary farmer. Some years ago, a large fermenting heap of manure and leaves (always giving off ammonia, also to be utilised, not wasted) was not so uncommon a sight under glass as through the spread of hot-water heating it has since become. Let the farmer take a hint from the gardener of the last generation. To point out all he might do and how he might

best do it, would be to write a small book; I can here only act the part of fingerpost to point out a road along which the farmer should surely find it profitable to travel.

TENURE.

It will not have escaped readers that I have said nothing on this subject, though it will no doubt have been uppermost in the minds of many of those who may do me the honour of glancing through these remarks. I have thought it better in mentioning the different kinds of fruit which a farmer might grow, not to complicate what I had to say by continual consideration of how the advisability or otherwise of growing a particular thing would be affected by the nature of the tenure by which the farmer may hold his land. I prefer to deal with that matter in one paragraph, which shall not be a long one, for it is outside my task to discuss that very thorny subject, the English land laws. Shortly, then, we have at one end of the scale the man farming his own freehold, at the other the tenant at will, and, at all stages between them, the men who hold leases of varying lengths. The first scarcely requires to be told by me that he may do anything that any man may. For him are the standard trees of any and every kind which, while perhaps slow in coming into bearing, remain prolific through a long life. He is under no compulsion to hurry about returns in fruit. Let him plant his trees, for whether he get fruit at first or not, every year thereafter adds to the value of his freehold, and anything else that he may be in the mind to do, to obtain annual returns, he can do. The men with leases will find out first whether they can make an equitable arrangement with their landlords as to what is to happen at the end of the lease. What would be an equitable arrangement depends so much on circumstances that I cannot enter upon discussion of details, but obviously it would have to be based on the recognition of whatever value the tenant may have added to the freehold. Should no arrangement be possible, plainly he must plant only such early fruitful fruits or form of tree as will recompense him before his lease expires. Some two years ago Mr. William Paul of Waltham Cross, admittedly one of our highest authorities on horticulture, made a since frequently quoted statement that no one should plant fruit-trees on a shorter lease than thirty years; but a statement like that, divorced from the context, may easily be misleading. Many fruit-trees are done with in less time than that, while a good standard *Blenheim Orange* apple tree is at that age in no more, as one may say, than full swing. Leaseholders must cut their coat according to

their cloth, but I most strongly urge them not to suppose that there is not very much they can do. Our leading nurserymen have worked wonders in the direction of producing early fruitfulness, and there is always open to the farmer to utilise his waste heat, and in regard to the latter he need not have the haunting fear that he is working for the most part for others to reap where he has sown; for "glass," unlike a long-lived tree, begins to deteriorate from the moment it is set up, and he can take a hint from the wisdom of the jerry builder—that is, he need spend no more than will build a house to last just his time. Subject to arrangement with the landlord, I have long believed that something might be done in the way of providing farmers with cheap glass-houses on some sort of hire-purchase system. To state that there are some obvious difficulties in the way is not to state much—there have been difficulties in the way of many things which have come to pass nevertheless. The tenant at will presents in their acutest form the difficulties which beset the leaseholder. He can (unless bound down), by varying his crops with some of those more commonly grown by the market gardener, often do a good deal to improve his position, but in the matter of fruit he is, except by arrangement with his landlord, helpless. His best hope lies in the fact that landlords—though some people scarcely seem to think so—are just as sensible as other people, and that "good tenants" who have still some little capital left which they may be willing to invest in the development of the soil, are not so plentiful nowadays that sensible landlords would hesitate (unless their circumstances prevent them), to make some arrangement by which the tenant's brains, capital and labour may be retained on the land.

I have tried to state as fairly as I can in the space of a few pages, how the farmer who is not already a skilled horticulturist may begin to obtain a share of the profits of the great and rapidly increasing fruit trade of this country. There are good seasons and bad, and nobody need expect to make a rapid fortune; but fruit-growing is now, and promises to be for many years to come, a far more profitable use of the soil than any other system of farming—in the ordinary acceptation of the word. Nor am I suggesting to farmers to enter upon a course where they have no precedent to guide them. Some articles on this subject having appeared in the 'Horticultural Times,' a correspondent took exception to some of the arguments as to what farmers might do, to whom answered in the issue of the 20th December another correspondent personally well known to me, from whose letter I offer the following extract:—

"First, let me say that I know that what is advanced in these admirable articles is both feasible and possible, as I know from practical object lessons which I have had presented to my view in Kent many times. Why, only a day or two ago, when discussing the articles in question with a friend who was—like the 'Echoes' man last week—sceptical as to its being possible for farmers to do better by combining horticulture with agriculture, 'I know it is possible,' said I, 'for I have seen it in progress many times during late years.' Now for a fact or two. Farmer No. 1 found that fruit paid to grow in conjunction with wheat, and so planted strawberries until, when I visited him last, he had 140 acres of this fruit alone; No. 2 had an ordinary farm, and combined with it fruit growing so largely, that at present probably he has some of the largest acreage of apples, pears, and plums in England, and still farms for cereals and roots, aye, and for brussels sprouts, &c., as well, and who has hundreds of thousands of feet of glass for tomatoes, "mums," roses, &c.; No. 3, a farmer, with a farmer's education, has planted fruit of all kinds by the hundred acres, and makes jam by the hundred tons, and is still a farmer; No. 4 began farming pure and simple, and took to 'doing better,' until now he and his sons farm fifteen farms, on what is said by your correspondent to be the impossible plan."

Is it really in the "*men* of Kent" that the difference lies? And is it always to be so?

X.—*Notes on Farming in the United States, or Hints to those intending to Emigrate.* By C. P. CAPPER.

YOU will often see an advertisement in some of the agricultural or daily papers, which runs as follows:—"Wanted, young gentlemen to learn farming, in the United States. Good home comforts, etc. Tuition 100*l.* a year."

The following notes, written by one who left England years ago attracted by such an advertisement, who has had considerable experience of pupil-farming and has since farmed for himself in both the West and East of the United States, may be found of some advantage to those who contemplate coming out.

And who and what are these, and why do they emigrate? Often they are clerks tired of being tied down to humdrum life in a city; sometimes they are the younger sons of large families; and frequently they are ne'er-do-wells; if the latter,

You will learn infinitely more this way than by going to a pupil-farmer, and will save your 100*l.* to help you stock a farm on your own account, after you have had two or three years' experience at this kind of work. If you have no capital to start with, then it is necessary to keep on longer and earn what wages you can until you have laid by something.

Since writing this, I have seen in the London 'Graphic' of October 4th, 1890, an article on pupil-farming in Manitoba, which not only bears out what I have stated, but shows that at times the pupil fares even worse.

"A victim" writes:—"Public attention is likely to be drawn for some time to the condition and surroundings of young Englishmen in Canada and the States. It only surprises me that such tragedies as the Benwell murder are not of more frequent occurrence, considering the number and character of the men who go out, or are sent, to the Colonies, with little or no knowledge of the difficulties and dangers which beset them. I started from the London Docks in June, 1888, on one of the Allan Line steamers with 10*l.* in my pockets. My destination was a farm in Manitoba, fifteen miles from a town, containing 3000 inhabitants. To the proprietor of that farm I paid 50*l.* for a year's tuition, including board and lodging. After arrival, I spent one day in Montreal, and, thanks to the advice of a friend, avoided the companionship of the many gentlemen who stand about the hotels, smoking cigars, and keenly watching for the arrival of a green Englishman, as they call him. After three days and three nights on the cars, I arrived safely in Manitoba, and proceeded immediately to the farm, getting there just as the other pupils were leaving off work. I was introduced to the four pupils by the farmer, whom at first sight I knew I should not get on with. They were just going to have tea. This meal consisted of pork, potatoes, bread, sometimes butter, and always tea, and was repeated three times a day. All through the summer we had to work from seven in the morning to seven in the evening. The work we had to do was sowing, harrowing, and breaking in the spring, ploughing in the summer, harvesting, then back-setting in the autumn, and finally threshing in the winter, which is the hardest work of all, the temperature being frequently 30 degrees to 40 degrees below freezing. I soon discovered my mistake, as numbers of farmers throughout Canada are only too glad to get young Englishmen, give them board, lodging, tuition and four or five dollars a month for their work, free of any premium whatsoever. As I said before, there were four pupils at 50*l.* per annum. I made the fifth; so that was 250*l.* The farmer did little work himself; he was nearly always indoors reading novels; we did

all the work. At the end of twelve months, I was worse off than when I started. Not having a penny in my pocket, I need hardly say I was not sorry when a letter came from home, with my passage money, enabling me to return immediately."

The facts stated in this letter, though applying only to one instance in Manitoba, bear out my experience regarding pupil-farming. The farmer so long as he gets his money, does not trouble himself much whether a pupil works and learns or not. The food here described is such as you would get at second-rate farms in the States, excepting that coffee would probably take the place of tea.

Where to go to, is a question the emigrant must decide before he leaves the old country. The United States are very large, and you cannot travel into the central farming or ranching districts in a day. For cattle raising I would advise west of the Mississippi River. Kansas, Nebraska, and Iowa, are well adapted for stock raising; or for rearing cattle, on a large scale, Texas. Most of the land in these states is very fertile and suitable for grain farming as well as stock raising. Markets are abundant, and Kansas City now affords a very good market for the three States I first mentioned.

But do not think you can come out, and in a few years make a fortune. By careful attention to work, you may possibly lay by a little money after a few years, but it takes time, and unless you have a large capital to start with, you will not realize any large profits from your farm at first.

Say you have 600*l.* to start with, you can either "homestead" * or buy a farm of 160 acres. Unimproved land will cost you to buy from $5 upwards per acre. Supposing you give $10 an acre for 160 acres of raw prairie land — that will cost $1600 (dollars),† then you will have to build a small house, which will cost about $150 to $200; also a stable, which will not cost much, and you will have a small balance left to buy some stock, and such farming implements as you will require. You can generally get a neighbour to break some few acres for you at first, at a cost of from $2·50 to $3 an

* The laws of the United States give to every citizen, or one who has declared his intention to become such (provided he is the head of a family or has arrived at the age of twenty-one years), the right to a homestead of 160 acres, to be selected at will from any of the surveyed and otherwise unappropriated public lands, without cost, except that of entry and conveyance fees. The applicant must undertake to reside on the land, build an inexpensive house on it, and cultivate a small patch. If he fulfils these conditions, he is given, on the expiration of five years, a title, in fee simple, to the land direct from the Government. This refers to land owned by the Federal Government, but most of the various States also hold land which can be obtained by settlers under varying conditions, practically free of cost.—ED.

† The dollar equals 4*s.* 2*d.*

acre. Of course this assumes that the work is done on a cheap scale.

If you have 1000*l.* or 1500*l.* to invest, I would advise buying an improved farm. Often you can buy a man out who, having homesteaded a year or so before, finds that he has nothing to live on during the forthcoming winter, and is only too glad to sell everything he owns for enough money to enable him and his family to get to his former home. I have known many such cases. Improved farms cost from $10 to $50 and upwards an acre.

What kind of farming pays best? is often asked, and does farming pay at all? In my opinion the profits on stock-raising far exceed that on grain-farming. Grain-farming in the West is especially uncertain. When the season is good, crops grow well, but the markets are consequently low. There is certainly this advantage that, in the West, there is not that outlay on manures for fertilizing the ground which is necessary in the Eastern States; corn (maize), wheat, oats, or rye, all do well without any fertilizer whatever. Although I have always found it best to scatter what barn-yard manure I had over the fields, yet some farmers do not do even this. In the Eastern States it is entirely different. Unless you manure your ground well you need not expect any good crops. It costs many dollars every year to put in your crops in the East, and after expending a good deal of money on patent fertilizers, the season may be bad and your money will be almost thrown away. Not entirely, because what you put on the ground goes to enrich it for future crops, but even then you require to use more fertilizers with the grain you are next sowing. On the other hand, when you do get good crops, you have a much better market in the East than in the West, and it need be so when you have to expend a good deal more money to procure a crop. Yet if you have a farm well situated in any of the Eastern States, clear of all mortgage, and well stocked, you ought to be able to lay by a fair provision for your old age.

The English farmer has decidedly better ways of caring for his crops, &c., than we have in America. For instance: in England the farmer takes considerable pains to thatch his grain and hay, whereas in America they are stacked out in the field, and seldom or never thatched or even the slightest covering put over them. I think it would be a great saving to American farmers if they were to adopt this English practice; often the hay or grain gets rotten or mouldy through not being properly protected. Those who have the accommodation generally get all they can into their buildings or barracks (coverings for hay and grain made of four posts about 20 feet or

more high, with a movable roof which can be raised or lowered as the grain is put in, or taken out). Tons of hay and grain are, however, annually left out, and by spring a large portion is good for nothing, except to be thrown in the barnyard. I could also mention other instances in which I think the English farmer is more proficient than the American, though in procuring their crops with the least amount of labour and expense the American has the advantage. In conclusion, my advice to any young fellow who wishes to start farming in America, is to go West, and not attempt to first gain experience in England, that will after all be of little use to him abroad.

XI.—*Agricultural Geology.* By PRIMROSE McCONNELL, B.Sc.

THE science of geology, so far as it applies to or explains the broad principles which underlie the art of agriculture, and the local practices which vary with every change of locality, has received scant attention at the hands of writers and teachers. Even text-books which profess to specially treat on the matter, touch only the outside fringe of it, as for instance in the case of Cameron's 'Johnstone's Agricultural Chemistry and Geology' —the first issued and best book of all in its particular department—where only 140 pages out of a total of 500 are devoted to a hurried sketch. In this short article it is impossible to do more than point out very generally some of the results of the influence of geological formations on the practice of farming, as regards soil, climate, crops, and live stock.

Soil and climate are both results of geological formations. It is hardly necessary to demonstrate this in the case of the former, because nearly all that has been heretofore written on the subject has been with reference to soil. Soil is in itself a geological formation, either derived from the weathering of the rock below, or from the drifting of eroded material from rocks at a distance and at a higher elevation. The transported or drifted soils occupy about one-half of the country, especially the northern half—and are mostly formed by the weathering of the "boulder clay" and "glacial drift," which was left as the result of ice-action when the glaciers retreated from Northern Britain. But as this drifted material always worked from the higher ends of valleys downwards, or from the highest hills down to the lower parts, we have generally a good idea of the origin of any given soil. A clay formation will produce a clay soil; a sandstone rock, a light sandy soil, and so on. The

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* See 'Library,' p. 356.

maps of the Geological Survey are thus a very good indication of the nature of the land for farming purposes, while the "Drift Maps," now being issued by the Department, will still more accurately represent the surface soils.

That climate is a result of geological conditions is specially true of the British Isles. The occurrence of the older and more indurated rocks in the western parts has prevented the whole of the British Islands from long ago being washed away by the Atlantic breakers, but these waves bring with them the heat of the Gulf Stream, so that the average climate is nearly the same all over, the differences being mostly due to local influences, such as elevation, exposure, proximity to the shore, occurrence of lakes, rivers, hills, &c., all of which owe their existence to the nature of the strata beneath the surface, and are wholly modified thereby. In fact, these physical features of a district have as much to do with a farm as the special nature of the soil, and both are mainly controlled by the character of the rocks beneath.

But the influence of the rocks extends not only to the soils overlying, but also to the plants which grow on them. We see this exemplified in the case of the oak and elm preferring heavy clay soils, the beech a calcareous soil, and the apple-tree red sandstone soils, while the nature of the herbage often shows the outcrop of particular rocks underneath the soil along hill-sides. The like influence extends to the cultivated crops, which can be exemplified by an instance or two. Mr. Henry Evershed points out that Chidham wheat thrives on the loams of the Lower Tertiaries, but refuses to grow on the London Clay, though these soils occur in the same district. Again, Mr. Gilbert Murray points out that oats will not grow on the Oolitic Sandstones of Northamptonshire. Instances of this nature could be multiplied without end, and many such must be known to farmers which have never been placed on record, though they are important facts. The late Professor Buckman compiled a table showing the predilections of some of our fruit and forest trees for certain formations. Thus the apple and the pear would thrive on the Old Red Sandstone, but almost refuses to live on the Mountain Limestone; the oak takes kindly to the Oxford Clay, but almost dies on the Oolitic Freestone, while the beech exactly reverses this state of matters, and so on in an endless number of instances.

When we take into consideration the live stock of the farm, a vast subject opens up before us. The more the matter is studied, and the more information is brought to light, the more certain does it become that the various breeds owe their peculiarities or differences from one another to the effects of soil and climate

acting through many generations. The interference of mankind in the way of breeding, selection, &c., is of comparatively recent date, and the special characteristics of each were indelibly stamped on them long before man interfered. Take for instance the breeds of cattle. We are all pretty well agreed that our cattle are descended more or less directly from two species, the urus and the Celtic ox. These two breeds were in our islands, or brought here at the time when our Continental neighbours began to invade us after the evacuation of the Romans. After a lapse of twelve or thirteen centuries we find on coming near to our own times that every locality has a breed of its own, and I know of no influence to produce this variation excepting soil and climate. It is certain that in these centuries of continual war, incessant raiding and cattle lifting between neighbouring barons or chieftains and general turmoil, nothing was done in the way of selection or breeding, but the animals were simply allowed to breed and rear themselves. The improvement following on the interference of man has all been carried out within the last century or so, but the special types of each breed were already fixed.

If our breeds owe their diversities of characteristics to diversities of soil and climate, then the converse will be equally true, that where the same soil and climate exists over a large area, all the different kinds of cattle will there tend to revert back to one common type. That this will be true of the American prairies, the editor of the 'Iowa Homestead' has no doubt. He says:—"The difference between breeds is every year becoming more manifestly a difference in the colour of the hair and the size and shape of the ears. Will not the various breeds of cattle in a short time approximate to one common type, or at most two, the beef type and the milk type? We think this is manifest destiny on the same parallels of latitude and on the same geological formations. It is impossible to escape the effects of soil and climate. It was different soils that evolved the different breeds from the aboriginal stock, and similar soils and feed will wipe out the differences."

This is good news for British breeders, for it means that the Americans must always keep on importing fresh blood from this side to keep up the original type, or else develop a new type for themselves, as they have done in the case of the trotting-horse, the Poland-China pig, and the American-merino sheep.

An analogous state of matters is equally true of all the other domestic animals. Of sheep it has been said that "if a few of the same breed were to be turned out on to every kind of soil in Great Britain, we know from experience that in a few

years they would become so much altered in appearance and in outward form as to be unrecognisable as belonging to the same family; and whatever form or size they after a time naturally assumed could, by selection, be altered sufficiently to create a variety of breeds."

The idea has often occurred to me that some of our landed proprietors who have a park at their disposal might without any expense to themselves carry out an experiment which would throw much light on the origin of breeds and the effect of soil and climate. The experiment is analogous to that made by Darwin in the case of pigeons, for the purpose of allowing the natural type to show itself. If half-a-dozen animals—say two bulls and four heifers—of as many breeds as could be accommodated, were turned loose and allowed to inter-breed and live as much as possible in a state of nature, taking care that the king-bull did not get more than his share of the females, and killing off the oldest animals only when they became too numerous, then I am certain that in a few generations the type best suited to that particular soil and climate would show itself and predominate over the others.

One thing that the study of geology impresses on me is the benefit to be derived from the preservation of local breeds of all kinds of animals. They have been made by the natural influences of their locality, and if the same care were given to breeding and developing them that has been given to, say, Shorthorns, Leicesters, Shires, &c., they would surpass any of those in their own district. There are, of course, objections to multiplying the number of breeds, but all those at present existing should be maintained and improved by those who possess them, rather than let them become extinct, unless indeed there is some very great individual drawback.

It is only possible in this short paper to touch on a few of the salient points of the subject, but facts are accumulating as the time goes on, and it is not too much to say that before long agricultural geology will be as much valued by the farmer as is agricultural chemistry.

XII.—*Feeding for Butter and for Cheese.**

By F. J. LLOYD, F.C.S.

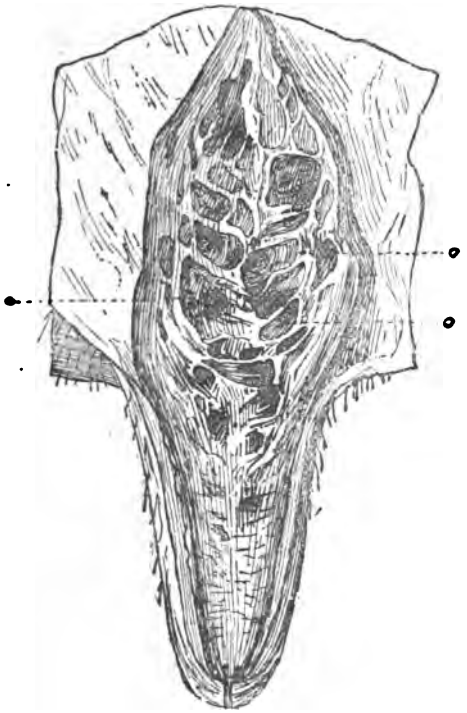
IN any attempt to popularly explain complex and hidden processes of nature we must, where possible, commence with what is visible and known, and gradually pass on to that which

* Lectures delivered in the Working Dairy at the Society's Rochester Meeting, June, 1890.

is less evident and not well known. The external appearance of the udder of a cow, with its four teats, is well known, also that it is possible for one of these teats to dry up without the others doing so. Hence it is evident that the udder consists of four distinct and separate milk-producing organs, each with its special outlet. These organs are known as the milk-glands.

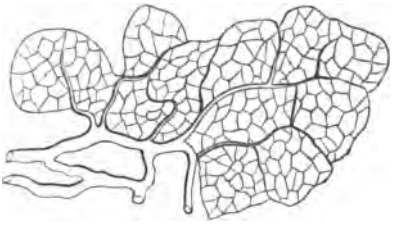
If we make a longitudinal section of one of these glands through the teat, we find a central passage or cistern, in the sides of which there are numerous openings (Fig. 1 *o*) leading into passages which branch off from this cistern.

Fig. 1.



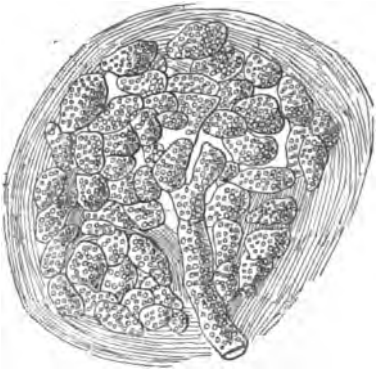
These passages subdivide, becoming smaller and smaller and more and more numerous, like the branches of a tree, until they finally end in minute capillaries (exceedingly minute tubes) which enter into vessels called lobes (Fig. 2), as the veins or passages in the stems of a tree finally end in the leaves.

Fig. 2.



The minute structures of which these lobes are made up are termed follicles (Fig. 3), and they are about the size of a

Fig. 3.



hole pricked in paper with the point of a very fine pin. Yet it is within these very minute vessels that what we term milk is formed.

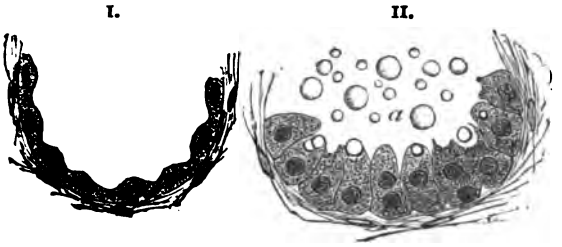
The Formation of Milk.—It is necessary before we can understand this process to subject these minute masses to the very highest powers of the microscope, to do which the organ must be destroyed. Hence arises one great difficulty which has caused considerable doubt to surround the teachings of those who, like Fürstenberg,* have devoted much study to the subject. Whatever view one adopts will find strong opponents. I therefore put before you that view which my own studies and observations lend support to.

The interior of these minute follicles is lined with small bodies termed cells, which in the udder of a dry cow are

* 'Die Milchdrüsen der Kuh.' Leipzig, 1868.

long, thin, flat bodies lying close to the outer coating of the follicle (Fig. 4, I.). But when taken from a cow in the full

Fig. 4.



milking period, these epithelial cells stand out into the interior of the follicle, and are large and distended with material (Fig. 4, II.).*

A careful examination of this material shows that it contains round globules of fat floating in a granular mass.

The researches of biologists and physiologists have shown that the granular or principal contents of all cells is a nitrogenous substance, to which the name of Protoplasm has been given. Professor Huxley has aptly termed it "the physical basis of life," † and it is by the activity of this Protoplasm in the plant that the farmer is enabled to grow his wheat, barley, roots and grass, while in the animal it forms meat and milk. Protoplasm, is somewhat similar to the albumin or white of egg. In the cell of the milk gland it takes the form of casein, and by its living activity forms fat. We have proof that it is also capable of breaking down into fat, after leaving the organism. If colostrum, which, as is well known, is exceedingly rich in nitrogenous matter, be kept, the percentage of fat which it contains materially increases.

These and other facts, combined with the microscopical evidence we possess, prove that fat is the result of the living activity or breaking up of the protoplasm of the epithelial cells. Hence there can be little doubt that the globules of fat seen in the epithelial cells are the same as are subsequently found in the milk, and constitute the butter-fat.

The question now arises, How do they get there? which involves the larger question, How is the milk itself produced? There are two theories, each of which has its advocates. The one maintains that the cells break away from the lining of the

* These figures are taken from Landois and Sterling's 'Physiology,' by the kind permission of Messrs. Charles Griffin and Co., the Publishers.

† 'Selected Essays,' by T. H. Huxley. Macmillan & Co.

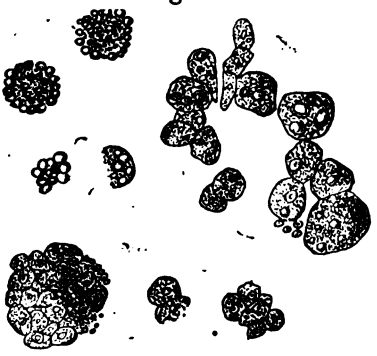
follicle, are carried into the ducts, and constitute milk. The other theory assumes that the cells do not break away, but have the power of allowing the fat globules to escape and also secrete a liquid, and that these two constitute milk. My own opinion is that both theories state part of the truth, that the cells have the power of secreting a limited quantity of liquid, and having secreted this liquid, the cell itself breaks down and passes into the milk.

Let me state briefly some of the grounds upon which this opinion is based.

The Microscopical Evidence.—In the microscopical examination of these follicles some of the cells have been found with their cell-wall broken away, and their contents being ejected into the vessel itself (Fig. 4, II.). It may be said this was due to the destruction of the cell in preparing it for examination.

In colostrum, which is the peculiar first milk, due apparently to an abnormal state of activity of the milk-gland, we find many of these cells which have come away bodily without breaking down at all, while others may be seen in every stage of the breaking-up process (Fig. 5). Here again, however, we

Fig. 5.



have a condition which only lasts some week or ten days at most, and the question of interest is, whether the normal, *i.e.* usual, formation of milk goes on in the same way.

For the full answer to this question we shall have to consider the chemical evidence; but there is one more fact which lends support to the hypothesis that the cells actually come away. Those who use a steam separator know that after working for some time a thick glutinous scum separates from the milk and surrounds the inner lining of the separator. A careful microscopical examination of this shows numerous unbroken cells similar to those found in colostrum, hence it is evident that

these cells are always being given away from the epithelial lining of the secreting vessels during the natural formation of milk.

The Chemical Evidence.—When we come to consider the enormous amount of milk which a good Shorthorn cow is capable of yielding, many, at the Milking Trials held by the British Dairy Farmers' Association at Islington, having yielded from 50 to 60 lbs. in a day, it is impossible to believe that the whole of this material consists of broken-down cells. Nor could the fact that the first milk drawn from a cow is not nearly so rich as the strippings, or last milk drawn, be well accounted for on this supposition.

Further, many substances, such as salts of mercury, when administered to a cow, either as medicine or for direct experimental purposes, as also substances of peculiar taste or smell, when cows are being fed upon certain foods, pass into the milk; and these facts can only be explained on the assumption that there is an undoubted secretion from the milk-gland, and not merely a breaking down of cell matter.

On the other hand, there is strong evidence against the hypothesis that milk is a secretion only. It is difficult to believe that any secretion of a gland would show such remarkable fluctuations in composition as milk does, though the fluctuation in composition being confined mainly to one constituent, namely the butter-fat, lends some support to the assumption. But if milk were a secretion, we should expect to find its constituents in solution, as is the sugar and most of the mineral matter. Duclaux,* however, has shown that the casein is not in solution, but that it is in the form of a very attenuated jelly and cannot be filtered through unglazed porcelain. Hence we are forced to the assumption that milk is the result of a twofold activity, first a true secretion of the epithelial cells, and subsequently the breaking up of these cells into fat and casein.

It is essential that any theory of the formation of milk should account for all those peculiarities of composition which we know the milk of various breeds of cows, as well as of the same cow under different conditions, exhibits. The difference in composition between the first and last milkings is explained thus, the former would contain most of the secretion of the cells, while those having just accomplished their secretory action would be brought away in the last milk.

If, as we assume, the secretory power of each cell is limited, the quantity of milk will depend upon the number of cells which

* 'Le Lait.' Paris, 1887.

are active or the rapidity with which they are re-formed. When the re-formation is slow, the active cells will have a longer time to mature; microscopical evidence shows that this maturing is a formation of more and larger fat globules. Hence where small quantities of milk are yielded, we should expect milk richer in solid matter, especially in fat, and large fat globules. The milk of Jerseys and Guernseys, and other breeds of cattle yielding small quantities of milk, is found, both as regards its chemical composition and the size of the globules, to conform to this law.

On the other hand, if cell-formation were rapid, the amount of fat produced would be smaller in quantity and present in small globules. This, again, is borne out by the milk of Shorthorn, Dutch, and especially foreign breeds of cattle.*

Hence we come to the conclusion that milk is the product of the combined secretory power and breaking down of the cells which line the follicles, added to which the milk gland appears to act as an excretory organ—that is, has the power of allowing foreign substances in the blood to pass through it into the milk.

It will be evident that milk is a highly complicated and ever-varying liquid, and we now pass to the consideration of how the food of the animal affects it.

The Influence of Food.—The renewal of the cells of the milk follicles is the property of living matter, to which we give the name "growth." The rapidity of this growth will depend largely upon the ease with which the living protoplasm obtains from the blood the constituents it needs. All growth proceeds from the blood, the blood itself being maintained by the food.

The protoplasm of these cells is, as previously stated, highly nitrogenous, and about one-third of the solid matter in milk is nitrogenous. The call on the blood for nitrogenous constituents will therefore be great, and it is evident that highly nitrogenous food will be necessary.

A striking proof of this is afforded by the following facts, for which I am indebted to Dr. Gilbert. Amount of nitrogenous matter (Albuminoids), and of fat produced in one week:

	By Cow yielding 10 quarts of milk per day.	By fattening Animal increasing 15 lbs. per week.
	lbs.	lbs.
Albuminoids (Nitrogen Compounds)	6·60	1·13
Fat	6·33	9·53

* Since delivering these lectures I have received a valuable article from Professor Fred. D. Hont, which confirms that statement. (See Note Book, p. 283.)

Should these facts still fail to show how necessary nitrogenous food is for milk production, one other argument remains. Every farmer acknowledges the grass on a rich pasture to be the best food for a milch cow. The analysis of such grass proves it to be rich in nitrogenous matter. Moreover, in the practice of feeding milch cows, the necessity of nitrogenous food has been discovered; as also the need to vary the quantity of food according to the amount of milk yielded by the animal. Thus Sir John Lawes fed his dairy cows on roots, hay, and bran *ad libitum*, and 4 lbs. of cotton-cake to each cow yielding 28 lbs. of milk. For every 2 lbs. of milk yielded above this he added ¼ lb. cake, for every 2 lbs. below he deducted ¼ lb. cake.

Oil-cakes having been found by farmers beneficial in the feeding of milch cows, a very prevalent belief exists that the oil is the constituent which induces the increase of butter. The fact that most oil-cakes contain from three to six times as much nitrogenous food (albuminoids) as oil, seems to have been entirely overlooked.

Feeding with oil does not increase milk production, nor yet the richness of the milk in butter-fat. Indeed, it induces a tendency in the animal to fatten. Now fat may be deposited not only on the body of the animal, but in the tissues of the udder, and there is evidence to show that such a deposit diminishes the power of the udder to produce milk.

Nitrogenous substances when given in the food of animals are digested, enter the blood, and if not required will be subsequently excreted without having performed any adequate work in the maintenance of the body. Hence it is possible to err on the side of giving too much nitrogenous food as it is possible to err in not giving enough. The latter is by far the more common error, because the nitrogenous constituents are those most lacking in the foods grown on the farm, with the exception of the leguminous crops (beans, peas, &c.), while those artificial feeding stuffs which contain most nitrogen are generally the most expensive. Hence in the feeding of cattle it is essential to balance the nitrogenous and non-nitrogenous constituents in such proportion as shall produce the best result. This relation of albuminoids to non-albuminoids is called the nutritive ratio.

Food contains a certain amount of material which in its passage through the animal is unacted upon by the digestive organs, and is therefore called indigestible. Only that portion of the food which is digested helps to maintain the animal. Hence the proper nutritive ratio must exist between the substances digested. Of the constituents of food, the nitro-

genous substances and fat have been already mentioned. The remainder consists of starch, sugar, and closely allied bodies, spoken of under the general term "carbo-hydrates." One pound of fat is capable of doing the same work as 2½ lbs. of these carbo-hydrates. In 100 lbs. of good pasture grass, there are capable of digestion :—

2·25 lbs. Albuminoids.
0·52 „ Fat.
10·40 „ Carbo-hydrates.

If we multiply the fat by 2½ we obtain 1·30 as its equivalent in carbo-hydrates, so that good grass contains—

2·25 Albuminoids and 11·70 Carbo-hydrates,
or 1·0 „ to 5·2 „

The nutritive ratio of good grass is therefore said to be 1 to 5·2. This gives approximately the nutritive ratio of food suitable for milk production.

The work performed by the digested constituents is two-fold :—

1. It maintains the heat and growth of the animal.
2. It makes milk.

The quantity required for the former depends mainly on the weight of the animal, that for the latter on the quantity of milk produced and its quality.

I have calculated * the quantity necessary for each of these separately, and the result, compared with the calculations which have been made in Germany, is given in the following table.

The daily food of a cow weighing 1000 lbs. and yielding 20 lbs. of milk per diem should contain :—

	Dry Matter.	Digestible.		
		Albuminoids.	Carbo-Hydrates.	Fat.
Lloyd's Calculation	24	2·4	12·3	·35
German Standard	25	2·5	12·5	·40

As the weight of the cow diminishes, the amount of food necessary decreases. Whereas, if the weight of milk increases, the food must also be increased. Similarly if the quality of the milk is richer, the amount of food must be increased, not only in quantity but especially in the amount of nitrogenous matter it contains.

* 'British Dairy Farmers' Association Journal,' vol. v., part ii. p. 19.

While the amount of milk or of butter-fat yielded is partly due to breed, the food also exercises a marked effect. Darwin recognised the powerful influence of food in modifying the character of animals,* while Professor Stewart † of America goes so far as to assert that breeding only perpetuates an improvement begun by judicious feeding. Both feeding and selection undoubtedly play their respective parts in the formation of a good dairy herd, and neither the one nor the other is alone sufficient. How much can be accomplished by their combined action is well shown in the following table.

Number of lbs. of milk, from a herd which was being carefully fed and selected, required to produce 1 lb. of butter:—

	Milk.
1st Year	39·2 lbs.
2nd „	33·3 „
3rd „	29·0 „
4th „	23·3 „
5th „	21·0 „

If I have succeeded in making my views clear, it will be seen that the quantity of milk and butter produced by a cow depends mainly on the food being sufficient in quantity and highly nitrogenous, so as to form blood rich in nitrogenous matter; that when supplied with such blood, an increased activity takes place in the epithelial cells of the milk-gland resulting in the formation of globules of butter-fat, which increase is limited only by the structural capacity of the cow, and this may be perpetuated and increased by careful selection and breeding.

We must now proceed to consider to what extent, if any, the quality of this butter-fat can be affected by the food supply.

The requisites of good butter are good flavour, good keeping quality, and hardness.

All these depend partly on the skill of the butter-maker. Thus a good flavour is obtained by properly ripening the cream, by keeping all the apparatus employed sweet, and by not over-washing the butter granules when in the churn.

The keeping quality of butter depends mainly upon freeing it from all butter-milk; this can only be accomplished by judicious washing in the churn, and gathering the granules gradually together.

Hardness depends mainly on the amount of water left in the butter; this may vary from 9 to 19 per cent. Water being liquid at all ordinary temperatures, the more there is present the softer the butter; in the summer too much is generally left in, which makes the butter soft, while in the winter butter frequently con-

* 'Variation of Animals and Plants under Domestication,' vol. ii. p. 309.
† 'Feeding Animals,' p. 16.

tains far less water, and is too hard. The finer the granules are when brought in the churn, the more water will the butter retain, and no amount of subsequent work on the butter-worker will get rid of it. In summer, therefore, it is necessary to collect the butter into larger granules than in winter, so as to exclude water. And before working it is essential to place the granular butter in a cooling box, not merely to lower the temperature and hence harden the granules, but mainly to allow the excess of water to drain away. In the winter smaller granules and more water are advisable. Such are the chief points in the manufacture of butter which affect its three fundamental properties. These, however, especially the taste and the hardness of the butter, are also influenced by the food. The flavour will be injuriously affected by feeding with (*a*) decaying food, such as decaying cabbages; (*b*) food containing weeds, or foreign seeds; (*c*) an excess of certain foods.

In order to realise how this happens it is only necessary to remind you that the milk-gland is an excretory organ, and in this way unpleasant substances in the food enter the milk.

How the butter-fat is affected cannot be so easily accounted for.

Butter-fat, like all other fats, consists of glycerine and certain acid bodies termed fatty acids. Some six or seven such acids are present in butter-fat, some of which are volatile, or pass into vapour when heated, while others are non-volatile. The amount of volatile fatty acids varies, and the variation appears to be due partly to the nature of the food. I have examined regularly every month for two years butter made by a member of the Society's Council (W. Ashcroft), and have found the volatile fatty acids vary from 4·47 per cent. to 7·04 per cent. The fluctuations are even greater when we compare the butters of different herds. Now the hardness of butter-fat, speaking generally, increases as the non-volatile fatty acids increase, and decreases as the volatile fatty acids increase, and the flavour and keeping property is probably at the same time affected. The influence of food on butter has not yet received that careful and systematic study which the subject deserves. The following statements are culled from many sources, and cannot be said to have the weight of well-proved facts. However I give them, if only as a guide to further observations on the subject. An excess of oat-straw or barley-straw gives a bitter taste to the butter and makes it white and hard. Lupins, rape-cake (if it contains mustard seeds), palm-cake, carrots and swedes, when given in too large quantities, are all said to injure the flavour of the butter. One authority states that by giving from 1 to 2 lbs. of malt combs with the swedes any injurious effect of the latter may be counteracted.

Of substances which are said to improve the taste of butter we have white mustard (*Sinapis alba*), called in France "Herbe au Beurre;" malt-combs, provided not more than 3 lbs. per diem are given; and mangolds, the quantity of which ought not to contain more than one-fifth of the total dry matter of the food—*i.e.* under 50 lbs.

Substances affecting hardness may be tabulated as under:—

Produce hard Butter.	Medium.	Soft.
Dry Foods and those poor in Nitrogen.		*Succulent Foods.*
Linseed-cake	Wheat	Rape-cake.
Peas	Barley	Wheat-bran.
Vetches	Palm-cake	Oats.
Cotton-cake	.. ..	.. ..

FEEDING FOR CHEESE.

Cheese is a product due to the action of the ferment of the rennet stomach upon the casein of milk. The casein undergoes some change, not yet understood, by which it combines with the liquid portion of the milk, forming a thick jelly, and holding within it the solid particles of butter-fat. This jelly, when cut, allows some of the liquid to escape. Upon heating, it contracts, squeezing out more liquid and a portion of the fat. The liquid is termed whey; in it will be found the milk-sugar, soluble albumin, and a portion of the mineral matter of the milk. It will be evident that, for the formation of cheese, milk which contains as much casein as possible and not too much fat is needed.

We have seen that all food enters the blood; that the fat given in the food does not necessarily promote the formation of fat in the milk, indeed that the chief cause of fat production is the use of nitrogenous food.

Casein being nitrogenous, the use of nitrogenous food might be expected to increase the proportion of casein in the milk. This is not the fact. In the words of Professor Sheldon: "The composition of milk in any given ingredient does not necessarily respond to changes of the corresponding ingredient in the food."

The question therefore arises—and it is one of paramount importance to the cheese-maker—Is it possible to increase the amount of casein in milk?

The evidence which we at present possess tends to prove that it is not. Each epithelial cell appears to attain a certain maximum growth, and then to break down into the definite

constituents of milk. If the secretion of the cell is small, the final yield of milk will be small, and the relative amount o casein rather high. If the secretion is large, the proportion of casein is lower. The results obtained during the last few years at the Dairy Show, as calculated by Mr. P. McConnel, and given in his Report as Judge, 1888, strikingly illustrate the slight decrease in casein* with the increase in yield.

Breeds.	Lbs. of Milk.	Solids other than fat.
Jerseys	28·41	9·47
Guernseys	31·15	9·43
Ayrshires	34·26	9·28
Red Polls	43·10	9·12
Shorthorns	44·80	9·08
Crossbreds	51·86	9·05
Dutch	43·31	8·85

The constancy of the 'solids other than fat' is more strikingly seen when the results of one breed alone are considered.

The average composition of 242 samples of milk yielded by Dutch cows, and received at a factory in Arnheim during the year May 1889, to April 1899, was:—†

Fat	3·00	per cent.
Solids other than fat	8·87	„
Total solids	11·87	„

The fluctuations in the 'Solids other than Fat,' are shown by the following averages:—

	Percentage of Solids other than Fat.
Lowest—August	8·69
July	8·77
June	8·80
May	8·80
April	8·80
Highest—October and March	9·02

The average composition of the milk of Dutch cows obtained at the Dairy Show, was:—

Fat	3·26
Solids other than fat	8·85
Total solids	12·11

There can be little doubt that cows sent to a Dairy Show will be better fed than cows kept merely for the supply of milk

* The exact determination of casein has not been made, and the 'solids other than fat' which contain the casein will be here referred to. The relative composition of these solids has been proved to be most constant.

† 'Milchzeitung,' 21, 1890.

to a factory. If the food could influence the solids other than fat, we should expect to find it shown in this comparison, yet the average results are identical. Not so with the fat, which, as we should expect from the preceding arguments, is greater in the Show-fed animals.

That there is a slight fluctuation in the quantity of 'solids other than fat' with the season of the year, is shown not only by the preceding results, but also by the results of analyses made in my laboratory during the last few years.

The average composition of 238 samples has been :—

Fat	3·50
Solids other than fat	9·00
Total solids	12·50

The average composition during the seven grass months was as follows :—

Month.	No. of Samples.	Solids other than Fat.
March	56	8·96
April	55	8·93
May	55	8·93
June	23	9·02
July	15	9·03
August	17	9·04
September	17	9·17

Thus, while fluctuations occur they are very slight, in the milk of the Dutch cows the extreme average fluctuation being only ·33 per cent., and in the samples analysed at my laboratory ·24 per cent. Assuming the whole of this fluctuation to be in the casein, it does not amount to one-tenth of the total casein present in the milk. Hence the same result would be obtained by increasing the flow of milk by one-tenth. Although experiments have been made for me by several farmers, they have not yet been able by any manner of feeding to materially alter the proportion of 'solids other than fat' in milk.

What then can be done? The object of the cheese-maker must be to increase the flow of milk. Now the quantity of milk yielded by a cow depends upon—

1. The breed of the cow.
2. The individual capacity; due to the size and action of the secretory organ.
3. The effect of the food.

On the first two of these points little need be said. The largest milk-producers are Shorthorns, Dutch and Ayrshire

cattle. These are also the largest-sized animals. In fact not only in breeds, but in individuals of a breed, the larger-sized animals appear to produce the greatest quantity of milk.

That a large organ is essential there can be no doubt; it is not possible to put a quart of liquid in a pint pot, nor is it reasonable to expect a cow with a small udder to produce a large supply of milk. The "Guenon" or "escutcheon" system of judging cows is based mainly on the fact that it affords a guide to the size of the udder.

But the subject upon which I wish to dwell more particularly is the influence of food upon the milk-yield, especially in its relation to cheese production.

The importance of the food supplying the necessary constituents holds good here as for butter-making, as also the necessity of providing food sufficiently rich in nitrogenous matter, that is, having a proper nutritive or albuminoid ratio. But, as an excess of nitrogenous food tends to produce butter-fat, which is not required by the cheese-maker, except for Stilton cheese, the proportion of albuminoid matter in the food must not be higher, and may probably with advantage be a little lower than for butter production.

Common experience has shown that no food so tends to promote the secretion of milk in quantity as succulent food. Hence the cheese-maker seldom utilises milk for cheese production until the cows have been turned out to grass.

In the early spring, and even later in a bad season, grass alone is not sufficient to supply the nutriment required by a good milker. Thus the quantity of cheese made by a gallon of milk in April will be about $\frac{9}{10}$ of a lb.; in June, 1 lb.; in August, $1\frac{1}{10}$ lb.; increasing as the grass improves in quality. An animal is not capable of utilising some of the constituents present in early grass; they have not been built up into sufficiently complex compounds to act as food. Thus the nitrogen, which is subsequently converted by the plant into albumin, is taken from the soil mainly as nitric acid; so long as it remains in this form it acts merely as medicine, not as food. Even some of the compounds intermediate between nitric acid and albumin have but slight feeding value. Early grass is therefore liable to be deficient in nutritive nitrogenous compounds. Some farmers give a little hay at this time of year to their stock, especially if the cows are taken in for shelter overnight. But hay is not sufficient, and a little meal mixed with a little cake should also be given.

The presence of these non-nutritious bodies in early grass sometimes causes scour, to prevent which the tonic effects of ordinary cotton-cake have been found advantageous.

If further proof be needed of the want of nutritive matter in

early grass, we find it in the quantity and quality of the cheese yielded. Cheeses made in the spring are not equal to those made in the autumn; the same quantity cannot be made, nor yet the same quality obtained, while the former require far more care in manipulation and are more liable to defects. There is no proof that this is due to any peculiarity of the casein present in the milk at this period. There is, however, considerable evidence to show that both the quantity and quality of cheese depend greatly upon the butter-fat present. Indeed there is good reason to think that the quality of cheese is affected more by the butter-fat than by any other constituent. Thus, if a quantity of milk were divided into two portions, a part of the fat extracted from one, and a cheese made from each portion, we all know how different would be the resulting cheeses, not only in quality, but in weight. The loss in weight of the cheese made from the partly skimmed milk would be greater than was due to the weight of fat extracted.

There is one subject of considerable importance to the manufacturer of cheese which does not appear to have received sufficient attention, viz.: the part played by the mineral constituents of milk. Milk contains 0·7 per cent. of mineral matter, in other words, one gallon contains over $1\frac{1}{10}$ ounce. Thus in a large cheese vat, where sufficient milk is being treated to make three Cheddar cheeses of 50 lbs. each, there will be present over 10 lbs. of mineral matter. Some of this mineral matter is combined with the casein of the milk and remains in the cheese, the rest passes into the whey. What remains in the cheese appears to exercise some slight influence upon the ripening process, though the most important functions of the mineral matters are probably exerted prior to the ripening process.

Unless sufficient and proper mineral matter be provided in the food of a cow, her secretion of milk is checked, and it appears that other effects, not yet sufficiently understood, follow the want of proper mineral nutriment.

The composition of the ash of milk is given by Dr. Fleischmann as follows:—

Phosphoric acid	28·31
Lime	27·00
Potash	17·34
Soda	10·00
Chlorine	16·34
Magnesia	4·07
Oxide of iron	0·62
	103·68
Deduct oxygen corresponding to chlorine	3·68
	100·00

Thus it will be seen that about one-half is phosphate of lime, one-fourth common salt (sodium chloride), and the remainder mainly potash.

The importance of lime and of phosphoric acid should be realised, for it is evident that the cheese-maker can no longer afford to ignore their value. The application of bones to the Cheshire pastures has had very remarkable results, improving not only the quantity but the quality of the milk and cheese produced. This is a well-established fact. On land very deficient in lime the mere application of bones is not sufficient, such land requires judicious liming as well. Herbage on land rich in lime is known to produce good cheese. Even giving the cows water to drink which does not contain sufficient lime is deprecated by some authorities, who advise, and probably with good reason, that a lump of chalk should be added to such water.

The practical effects which have been found to result from the presence of lime in the soil and water, or its absence, are well stated by Mr. G. Gibbons in an admirable paper on 'Cheddar Cheese-making,' to be found in Vol. XXI. of the Society's 'Journal,' p. 100. "The experience of good makers shows that milk produced from gravel or clay soil needs a considerably higher temperature in its manufacture into cheese than if produced on mountain limestone or sandstone formations. Also that a higher temperature is required where cows drink soft than where they drink hard water."

Second in importance is salt. The necessity of giving salt to stall-fed cows is well known; the same consideration does not appear to be shown to cattle out at grass. This is the more important, as salt is not naturally a leading or necessary constituent of plants. There are a few exceptions, such as mangolds, and this may in part account for the well-known influence of mangolds in increasing the flow of milk. Strangely enough, those counties in England where we should expect to find a natural supply of salt are the counties which have become most celebrated for their cheese.

The value of salt as influencing the production of milk appears to have been known to the ancients. In 'Virgil' we find: "If milk be thy design, bring clover grass, and from the marshy land salt herbage." Although it may be uncertain what is meant by "salt herbage," yet the analyses of such plants as are now designated by this name proves them to be rich in common salt and potash, and also of good nutritive value. Note, moreover, the advice to give clover; probably the most nitrogenous of all fodder crops.

The large proportion of potash in the ash indicates the im-

portance of this substance. As a rule it will be found plentifully supplied by clay soils, but on sandy and chalk soils there will frequently be a deficiency.

I believe that no system of artificial feeding will equal a good pasture for the production of milk for cheese-making, but it will be evident from the above that this pasture must be liberally and judiciously manured. Not merely the requisite mineral matters must be supplied, but also nitrogenous matters to build up the much desired albumin. The importance of the proper manuring of such pastures is so great that a few words may not be out of place.

In the application of nitrogen great care is necessary. Nitrate of soda and ammonia salts cannot be recommended, for they tend to produce a luxurious growth containing non-nutritious materials which subsequently affect the cheese. Nitrogen is best applied in some slowly available form, hence the double value of bones, which supply not only the necessary phosphate of lime, but also a slowly available compound of nitrogen. Farmyard-manure, judiciously applied, returns potash to the soil as well as the requisite nitrogen.

For supplying phosphate of lime, superphosphate must be used with care, especially on land deficient in lime. The acidity of this substance should be neutralised by mixing it with bones in equal proportions, and allowing the mixture to ferment in heaps for a month or so before being applied. This mixture is an admirable manure for pastures. Where liquid manure is used, gypsum may be employed with advantage to preserve it. Potash may be applied either as kainit or as muriate of potash; the latter is generally considered the better manure.

In summarising the results of this attempt to lay before you the present teaching of science as regards feeding for butter and cheese, I have attempted to prove the following facts:—The necessity in all cases of a sufficient diet, well balanced as regards its constituents, and rich in nitrogenous compounds, especially for butter-making; and the necessity of increasing the quantity of milk yielded rather than attempting to alter the composition of such milk where cheese is the first consideration. With this object, I have suggested that it is wise to manure well but judiciously the pastures on which the cattle are fed; to supply artificial food in the early spring; and, by keeping an accurate record of the milk-yield of each cow, to discover and breed only from those who possess large and active milk-producing organs.

XIII.—*The Society's Dairy Schools.*

By Thos. F. Plowman.

The placing of a large sum of money at the disposal of County Local Authorities (under the Local Taxation Act, 1890) for the promotion of Technical Education has led to many applications being made to the Society by public bodies in all parts of the kingdom, and in rural districts especially, for details of the working and cost of the Society's Dairy Schools scheme. This Paper has been prepared therefore with the double object of affording information as to the progress of the Butter and Cheese Schools to members of the Society, and of answering enquiries which are being received from other quarters.

The Butter School.

Its Origin.

For some years previous to the establishment of the Society's Migratory Butter School a fully-equipped Working Dairy was a conspicuous feature in the Society's Showyard, and one whose field of operations grew wider from year to year. Lectures, explanatory demonstrations, competitive trials of workers, and comparative tests of processes were here the means for conveying practical instruction. The interest these excited was shown by the large attendance both of spectators and also of those who took part in the Butter-making competitions, whilst satisfactory evidence was forthcoming that the effect of the lessons it was intended to inculcate was not lost upon the dairying of the district in which the exhibition was held. A desire was, in consequence, created for an extension of the Society's work in this direction, and it was felt that its organization might be utilised in providing further facilities for those who were anxious for instruction. The recommendations of the Parliamentary Commission on Agricultural and Dairy Schools gave an impetus to the movement, and Sir R. H. Paget, the originator and Chairman of the Parliamentary inquiry, Sir T. D. Acland, Mr. Maskelyne, M.P., and others, joined in calling the attention of the Society's Council to the conclusions at which the Commission had arrived. This resulted in a Special Committee being appointed to consider how the Society could further the recommendations of the Commission. The Committee, having come to the conclusion that this could best be done by the establishment of a migratory Butter School, drew up a scheme, which was approved by the Society's Council, who made a grant

for carrying it out. The plan proposed embodied a policy of mutual help, the Society joining hands with those outside it in an endeavour to assist the dairying interest of the country. It was deemed wise at the onset to confine the instruction to butter-making, reserving cheese-making to be dealt with later on if events justified it.

MAIN FEATURES OF THE SCHEME.

The Society's scheme, for imparting instruction in dairying through the medium of a travelling Butter School, came into operation in the autumn of 1888. Its course has been directed and controlled by the Society's Agricultural Education Committee, consisting of Sir R. H. Paget, M.P. (Chairman), Sir T. D. Acland, Sir J. F. Lennard, Earl Amherst, Rev. J. Goring, Messrs. C. T. D. Acland, M.P., J. D. Allen, C. L. F. Edwards, G. Gibbons, J. E. Knollys, E. H. Llewellyn, M.P., N. S. Maskelyne, M.P., H. B. Napier, and M. J. Sutton.

Under the scheme, as originally formulated, the Society organised and controlled the School, and provided skilled teachers and the necessary dairy appliances, the district visited undertaking, on its part:—

"1. To provide, free of cost to the Society, suitable premises (with a sufficient supply of pure water) for the School, including a room for a Working Dairy (to be heated in Winter), not less than 30 ft. by 20 ft. in size, to be available for a fortnight, with the option of extending the term to three weeks, should the Society desire it.

"2. To provide, free of cost to the Society, sufficient Milk for use in the Dairy, the Local Committee receiving the produce in return.

"3. To defray the cost of local printing and advertising in connection with the School.

"4. To guarantee not less than ten students for one entire course of instruction.

"5. To secure the services of a Committee of Ladies to assist in obtaining suitable lodging accommodation for such of the female students as may require it, and, generally, to supervise arrangements in connection therewith."

The instruction fees and receipts for admission of spectators were taken by the Society, and the proceeds arising from the sale of the butter made in the School were paid over to the Local Committees. The Society, however, having been assisted by grants from Parliament, has, during the past year, been able to render more pecuniary help to the Local Committees, and has handed to them half the receipts for fees and admissions. With this exception, the original conditions have been adhered to.

The initiative in obtaining the advantages of the School for a district is usually taken by the local agricultural association

or farmers' club, which places itself in communication with the Society, and formally assumes such share of the responsibility as falls upon the locality visited. The Society is thus brought into pleasant contact with kindred bodies whose organisations are available for the promotion of objects which both have at heart.

FEES.

A complete course of instruction in butter-making extends over ten days, but students can attend for shorter periods, if the School arrangements allow of it, though they are not eligible to take part in the School prize-competitions, or to receive the Society's certificate of efficiency. The instruction fees are:—

	£	s.	d.
For entire course of 10 days	1	1	0
„ one week's instruction	0	15	0
„ one day's instruction	0	5	0

METHOD OF INSTRUCTION.

In the morning, explanations, practically illustrated, of the various processes and appliances are given by two teachers, and, in the afternoon, the students, under the supervision of the teachers, reduce the instruction to practice. A gallon of cream per day (the produce of 12 gallons of milk passed through the separator), which should make 4 lbs. of butter, is served out to each student.

Except under special circumstances, not more than fourteen students, who are divided into two classes, are taught at one time.

Whilst the system of butter-making taught in the School is applicable to small as well as large dairies, the latest labour-saving appliances, such as the steam and hand separator, are exhibited at work, and their utility is explained. Students are also shown how to test the quality of milk, the various methods of raising cream, how to ripen cream, the use of the thermometer, &c.

Most of the students have been farmers' wives and daughters, the primary object of the School being to impart instruction to those who are actually engaged, or are about to engage, in the business of dairying.

Spectators are admitted to witness the instruction at a charge of 6*d.* each, which entitles to a non-transferable ticket available for a whole day. It is satisfactory to be able to state that 9305 persons have taken advantage of this.

For the benefit of the general public, as well as the students, free lectures on dairying subjects have been given in con-

nection with several of the Schools. Among those who have kindly rendered good service in this way are Professor McCracken, Professor Wrightson, Dr. Voelcker, Mr. F. J. Lloyd, F.C.S., Mr. B. Dyer, F.C.S., Dr. Bond, Mr. J. Oliver, and others. Many interesting and practical addresses have also been delivered at the opening and closing meetings of the sessions by members of the Society's Council, Parliamentary representatives, and others.

IMPLEMENTS AND APPLIANCES.

The implements and appliances used include the following, kindly lent by the firms named, viz.:—Laval Steam, Hand and Baby Separators, by the Dairy Supply Company, Limited; Engine, boiler, &c., to work the Steam Separator, by Mr. E. S. Hindley, of Bourton; End-over-end Churns, by Mr. G. Hathaway, of Chippenham; Butter-workers, by Messrs. Llewellin & Son, of Haverfordwest; the Jersey Creamer, by the Jersey Co., of London; and the Milk cans, and other tinned goods, by Messrs. Pond & Son, of Blandford.

Each student is provided with a churn, butter-worker, Scotch hands, thermometer, scoop, strainer, buckets (3), scrubbing-brush, salt, hot and cold water, muslin, and (when required) ice.

The following implements and appliances (purchased by the Society) are also in use in the School, viz.: lactobutyrometer, 23 temperature cans, tube-stand, 14 spout-tins, 9 measures, 18 hair-sieves, 98 tin pails, 16 can-brushes, 4 milk-cisterns, 12 bowls, 9 cream-basins, cream-can, and hardening-box.

The total value of the whole of the implements and appliances used in the School is about 300*l.*

PRIZE COMPETITION.

On the completion of the courses of instruction in a district, a public competition in butter-making, confined to the students, takes place and the interest created by the School reaches its culminating point in this final act of the proceedings. The prizes, usually ranging in value from 2*l.* 2*s.* to 10*s.* 6*d.*, are given by the Local Committee and the Society. All those students who are favourably reported upon by the Judge are presented by the Society with certificates of efficiency, which have an intrinsic value to those who need such testimonials of capacity. There have been many keen contests, and the public distribution of the awards by some one of influence in the district has afforded opportunity for the delivery of practical addresses on dairying.

Many well-known dairy experts have lent essential aid at

the competitions by acting as Judges; by no means a sinecure office when the difficulties of adjudicating on the merits of a considerable number of entries, all made at one time, in one building and under the same conditions, are considered.

SCHOOL BUILDINGS.

The buildings in which the School has found a home have been very various in character, as they have included, among other edifices, town halls, corn exchanges, malt-houses, disused factories, skating rinks, market halls, an hotel ball-room, and a metropolitan dairy. A little adaptation and utilisation of resources have generally been sufficient to render a building suitable, even when it has looked most unpromising, and a Ladies' Committee has frequently shown how much can be done with the aid of a few flowers and flags to brighten a dull interior and put its dinginess into the background.

PLACES VISITED.

The following is a complete list of the places visited by the School, with the number of students at each:—

Place.	Year.	No. of days School was open.	No. of Students for various periods.			
			10 days.	1 week.	Shorter periods.	Total.
Swindon	1888	21	21	1	10	32
Shepton Mallet	,,	31	32	..	2	34
Chippenham..	1889	31	36	..	8	44
Exeter	,,	21	22	3	..	25
Oxford	,,	21	20	1	4	25
Gloucester	,,	21	20	1	5	26
Clevedon	,,	21	27	9	..	36
Coventry	,,	21	22	1	6	29
Berkeley	,,	11	9	..	..	9
Hampstead	,,	21	24	..	..	24
Bridport	1890	21	26	..	..	26
Pembroke	,,	31	45	..	..	45
Rhayader	,,	21	20	..	2	22
Llwyn Madoc	,,	7	..	7	..	7
Builth	,,	7	..	14	..	14
Newbridge-on-Rye ..	,,	7	..	7	..	7
Wiston Park, Steyning	,,	7	..	15	..	15
Worcester	,,	21	24	2	4	30
		342	348	61	41	450

Some of the places named are not included within the district ordinarily covered by the Society's operations, but it

was felt that there should not be a hard-and-fast geographical limit when help was sought, and could not be obtained from any other source.

Though but few unusual incidents have marked the School's career, it has not been characterised by a dead level of monotony. Among the districts visited, Swindon will be pleasantly remembered as the pioneer of the rest; Hampstead, as affording the opportunity for a royal recognition; and Pembroke, as having furnished a contingent of forty-five students and nearly 2000 spectators who paid for admission. Others also have claims to be remembered, though space will not admit of their enumeration.

RESULTS.

The various Agricultural Associations, through whose instrumentality the School has visited a locality, have testified, in formal resolutions, to the great advantage it has been to their districts.

The following, among other similar expressions of opinion, was received from the Committee of the Oxfordshire Agricultural Society, and emanating, as it does, from so thoroughly practical a body, is especially valuable as a testimony to the utility of the School:—

"The Committee are deeply convinced of the usefulness of the work done at the Dairy School. The teaching was thorough and practical, and not one of the students but acknowledged the value of the lessons. That the knowledge gained was quickly applied was immediately afterwards proved at the Show of the Oxfordshire Agricultural Society, where three prizes for butter—in well-filled classes—were taken by one of the students. The Committee are convinced that in this as in most other districts the general quality of English butter ought to be better than it is. They believe, further, that until it is more uniformly good there is little chance of diminishing the enormous amount of foreign butter sold in this country. To attain this desirable end a dissemination of a knowledge of the right principles of butter-making is imperative, and the Committee are happy to know that a good work, which will probably have widespread results, was achieved by the Oxford Dairy School."

The students, too, have taken opportunity to express their sense of the benefit the School has been to them. Several have given after-proofs of their proficiency by honourably distinguishing themselves in the Working Dairies of numerous Showyards, from the Royal downwards, and news has come from time to time of some who have, in other directions, satisfactorily utilised the knowledge they have gained. In the Butter-making competitions at the Society's Annual Meeting at Rochester last year, of the sixteen money prizes and three

medals offered, open to the United Kingdom, eleven money prizes and two medals, including the Gold Champion Medal, were won by students who had attended the Society's School.

The School has been visited on several occasions by representatives of Her Majesty's Privy Council, and (later on) of the Board of Agriculture, who have expressed themselves most favourably, both as to the quality of the teaching and the general work of the School. The Introductory Report for the financial year 1889–90, presented to Parliament by the Board during last Session, says:—

"The most important of the movable Dairy Schools and Lectures were those provided by the Bath and West of England, and Southern Counties' Society. The travelling Dairy School organised by this Society, with the assistance of Local Committees, visited eight different centres during the year. In all of these, under the guidance of well-qualified instructors, butter-making was taught to regularly formed, well-attended, and appreciative classes."

Further on, the Report gives detailed particulars of the Society's scheme, and says:—

"The Inspector who visited this School was much pleased with all he saw; the butter made at the end of the first week's instruction being worth 3*d.* or 4*d.* per lb. more than that made at the beginning. He reported that the students appeared to take the greatest interest in their work, and that one student who ten days previously had been quite ignorant of the principles of butter-making had, the day before his visit, made butter the quality of which it would be difficult to improve. He also added that the butter made at the School was very much superior to that shown him as a good sample of the butter of the district." *

This official expression of opinion has been emphasized by grants from the Government of 100*l.* in 1888, of 300*l.* in 1889, and of 250*l.* in 1890. Such recognitions have been a great encouragement to proceed, and have enabled the Society to engage much more actively in the work than it otherwise could have done.

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* This was not the first recognition the Society had received from a Board of Agriculture. Among the Society's archives is an official communication, addressed in 1795 to the then Secretary (Mr. W. Matthews) from Sir John Sinclair, the first President of the old Board of Agriculture, testifying to the good work the Society was then carrying on, and asking for its assistance in promoting the objects of the Board. The whole of the letter is in Sir J. Sinclair's handwriting, and in it he states that he is persuaded that "the Board may depend upon the co-operation of the Bath and West of England Agricultural Society, on all occasions interesting, either to the district with which they are more immediately connected, or to the kingdom at large." This document is an interesting connecting link between the Society's past and present, and the testimony borne to the Society's usefulness by the present Board affords one more instance of history repeating itself.

Much of the success which has been achieved must be credited to the exertions of the teachers, Miss Davey and Miss Barron, whose practical knowledge and excellent method of instruction have been thoroughly appreciated by those who have attended the School. Throughout, the School has been under the energetic superintendence of Mr. G. Gibbons, the Society's Dairy Steward, the value of whose services can hardly be over-estimated.

It is hoped that there will be a large gathering of students, from the various districts that the School has visited, at the Society's Annual Exhibition at Bath in June next, as special prizes for students, both in money and plate, will be offered in the butter-making classes.

COST OF SCHOOL.

The Society's total disbursements for carrying on the School at the eighteen places mentioned, including cost of teaching-staff, purchase and carriage from place to place of plant, printing, advertising, prizes, officials, &c., amounted to 1311*l.* 5*s.* 11*d.*, and the receipts, including students' fees, admissions of spectators, &c., to 465*l.* 6*s.* 4*d.* The Society pays its teachers £1 1*s.* 0*d.* per week each and their travelling expenses, and also provides them with board and lodging, but no payment is made to them during vacations. The receipts have been supplemented by the Government grants before referred to, amounting to 650*l.*, which have therefore reduced the actual cost of the School to the Society to 195*l.* 19*s.* 7*d.* This, however, does not by any means represent the entire cost of the School, inasmuch as it does not take into consideration the expenses defrayed by the Local Committees of the districts visited. In most cases there has been a considerable difference between the price paid by the Local Committee for the milk and the amount realized by the sale of the produce, owing to the difficulty of obtaining so large a supply of milk for such a limited period as the duration of the School in a particular place. There has also been the cost of hiring and adapting the buildings used for the School, besides other expenses. These have been met by subscriptions from landowners and others, and by grants from local Agricultural Societies.

With a view to showing the total cost of the School, the Local Committees have been applied to for particulars of their receipts and expenses, and these are embodied in the following statement. No return could be obtained from two of the places visited by the School, and in each of these cases the receipts and expenses have been carefully estimated and included in the appended statement:—

STATEMENT showing COST of HOLDING the SCHOOL in EIGHTEEN DIFFERENT LOCALITIES during 1888, 1889, and 1890.

EXPENSES.	Paid by Society.			Paid by Local Committee.			TOTAL.		
	£	s.	d.	£	s.	d.	£	s.	d.
Teachers' salaries, board, lodgings and travelling	363	11	4	..			363	11	4
Stewards' and Judges' travelling and hotels	332	18	4	..			332	18	4
Purchase of Plant	72	4	8	..			72	4	8
Carriage of Plant	104	13	7	..			104	13	7
Secretary's travelling and Office ..	60	4	3	..			60	4	3
Buildings and fittings	48	14	7	263	14	0	312	8	7
Attendants and ticket takers	145	3	6	19	2	2	164	5	8
Printing, Stationery, Advertising and Postage	78	6	5	206	7	8	284	14	1
Prizes	40	4	6	91	3	6	131	8	0
Miscellaneous	65	4	9	109	2	6	174	7	3
Milk and Cream	..			1169	0	8	1169	0	8
Total .. .. £	1311	5	11	1858	10	6	3169	16	5

RECEIPTS.	Received by Society.			Received by Local Committee.			TOTAL.		
	£	s.	d.	£	s.	d.	£	s.	d.
Students' Fees	294	9	6	63	2	6	357	12	0
Spectators' Admissions	158	6	10	74	5	9	232	12	7
Miscellaneous	12	10	0	..			12	10	0
Butter and Skimmed milk sales ..	..			810	2	0	810	2	0
	465	6	4	947	10	3	1412	16	7
Net cost of School	845	19	7	911	0	3	1756	19	10
Total .. .. £	1311	5	11	1858	10	6	3169	16	5

THE CHEESE SCHOOL.

ITS ORIGIN.

A strong desire had been, from time to time, expressed in many quarters that the Society should make provision for instruction in Cheddar Cheese-making, and the success of the Butter School was an encouragement to the Agricultural Education Committee to endeavour to comply with it.

On March 25th, 1890, Sir R. H. Paget, as Chairman of the Committee, reported to the Council that the Committee recommended the establishment of a Cheese School, and that they were prepared to take steps to carry this into effect if the Council approved of it and provided the necessary funds. He moved that a grant of 350*l.* be made for the purpose, which was

seconded by Mr. Moore Stevens, supported by Mr. Maskelyne, M.P., Sir T. D. Acland, and Mr. Gibbons, and carried unanimously.

GENERAL ARRANGEMENTS.

The establishment of a Cheese School was a more serious undertaking, with regard to the general arrangements and preliminary expenses, than a Butter School, and necessitated the providing of a fixed abiding-place for some months, at least. The task of finding a suitable spot was delegated to a sub-Committee, who, after careful inquiry and personal investigation, selected the Palace Farm, Wells, as best fulfilling the requisite conditions. With the sanction of the Ecclesiastical Commissioners, in whom the property is vested, arrangements were made with the tenant, Mr. C. E. Wickham, for the entire use and control of his dairy, cheese-room, and cheese-making appliances. The Committee purchased the whole of the milk yielded by his cows during the time the School was open, at a uniform rate of 6½*d.* per imperial gallon; the whey being placed at Mr. Wickham's disposal free of cost. Mr. Wickham also undertook at a fixed rate of charge to provide board and lodging at the Palace Farm for the teacher and a certain number of students, and to find suitable bed-rooms near the School for those who could not be accommodated in the house.

BUILDINGS, &c.

The house, dairy and farm buildings were of a very suitable character, and had been only recently erected. They were also very conveniently situated, being not more than a quarter of a mile from the Wells Railway Station. The farm was 253 acres in extent, 30 of which were arable and the remainder pasture, the soil being a rather heavy sandy loam with a red marl and gravel subsoil. Between fifty and sixty cows were kept. The dairy was a detached building on the north-west of the dwelling-house. It was 20 feet long by 18 feet wide, and 13 feet 6 inches high. The walls were lined with glazed tiles and the floor was of concrete. The scullery adjoined the dairy, and in it the Society had a steam cheese-making apparatus fixed, which at the termination of the School, the tenant took at a valuation. The cheese room was within 6 inches of the same level as the dairy, and communicated directly with it. It accommodated 150 cheeses, and was heated by a coke stove.

STAFF.

The Committee were fortunate in being able to induce Mr. H. Cannon, of Milton Clevedon, Evercreech, to supervise the School, and his eldest daughter to act as the teacher.

Mr. Cannon enjoys a reputation second to none as a maker of Cheddar cheese, and he has gained the highest honours at the leading Agricultural Societies' Exhibitions. Miss Cannon had been actively engaged in her father's dairy, and had made the cheese which gained the Jubilee Champion Prize in the celebrated competition at the Frome Show in 1887. She had the training and experience which especially fitted her for the post of teacher, and the result has entirely justified the Committee's selection. The Committee had also the advantage of the great practical knowledge of Mr. George Gibbons, the Society's Dairy Steward, who superintended the carrying out of the general arrangements connected with the School. Included in the Society's staff was a bailiff, who assisted generally in the dairy, and checked the daily supply of milk.

IMPLEMENTS AND APPLIANCES.

The following implements and appliances belonging to the tenant of the farm were used, viz.:—2 cheese tubs with stands, 3 cheese presses, curd breaker, curd rack, curd strainer, milk cooler, milk strainer, 15 vats from ½ cwt., and 6 loaf vats. The Society added by purchase a 100-gallon copper cheese-tub, a set of cheese vats, a curd mill, a weighing machine, and a number of smaller appliances which are available for future Schools. The total value of the whole of the implements and appliances (including the steam cheese-making apparatus) used in the School is about 100*l.*

FEES.

A complete course consisted of four weeks' instruction, for which the fee was eight guineas, including board and lodging. Students who attended for shorter periods paid at the following rates:—

	£	s.	d.
For the first week (with board and lodging)	3	3	0
„ second „ „ „	2	2	0
„ third „ „ „	1	11	6
„ fourth „ „ „	1	11	6
„ one day (with board)	1	1	0

Day students were admitted only when the class for longer periods was not full. Students could attend beyond the four weeks, if the School arrangements permitted it, on payment of two guineas a week, inclusive of board and lodging. Those who attended for a week in the spring or summer were permitted to attend for another week in the autumn at half the first week's fee.

REGULATIONS.

If more persons applied to be admitted as students than could be instructed at any one time, preference was given to the

wives, sons, or daughters of dairy farmers and dairymen, the families of members of the Society having priority.

The number of students instructed at one time was, as a general rule, limited to four, but occasionally this number was, under special circumstances, exceeded. Cheese-making commenced each morning at seven o'clock, and was carried on all through the week, but it was optional for students to attend or not on Sundays.

ATTENDANCE OF STUDENTS.

The scheme was launched on May 6th, when the School was successfully opened, four students, the full complement, being present.

That the School supplied a want is shown by the fact that, from the date of its opening until its close on October 31st, there were ninety-two students, who attended as follows:—

Number of Students who each attended for a month			.. ..	5
"	"	"	3 weeks	1
"	"	"	a fortnight	6
"	"	"	a week	52
"	"	"	shorter periods ..	28
			Total	92

The Students were, with very few exceptions, the wives, sons, or daughters of Somersetshire farmers or dairymen, residing, in most instances, within a radius of twenty miles from the School.

Ample evidence has been forthcoming that the instruction given and the general arrangements of the School were satisfactory to the students. One student says:—"I write to you to say how well I got on when at Wells at the Dairy School. The cheese I have made since I have been home looks very well indeed, and my friends tell me I need not go back to school again." Another says:—"I am writing to express my entire satisfaction with the week's instruction in cheese-making which I received at the Dairy School, Wells, and with the arrangements made." Another says:—"I shall be most pleased to recommend any friend wishing to learn Cheddar cheese-making to go to the School for instruction." A father of one of the students writes:—"I am pleased to inform you that my daughter's cheese has turned out very well, and that she took two third prizes in the first and second classes at the Evercreech Show, and was commended in the first class at Frome against 46 exhibitors." These were entirely voluntary and unsolicited communications, and many others, verbally expressed, were to the same effect.

The School was officially visited by an Inspector from the

Board of Agriculture, who expressed himself as much pleased with all he saw there, and the Board has since shown its approval of the work by a grant of 100*l.* in aid of it.

SALES OF CHEESE.

Further satisfactory evidence of the practical character of the teaching was afforded by the good prices (as shown below) realised for all the cheese made, being the produce of 23,240 gallons of milk:—

1st	draft of	59	cheeses,	weighing	nearly	2	tons,	61*s.* 6*d.*	per 112 lbs.
2nd	„	70	„	„	over	3	„	66*s.* 6*d.*	„ „
3rd	„	103	„	„	about	5	„	67*s.* 6*d.*	„ „

This gives an average price of about 65*s.* 6*d.* per 112 lbs., or a little over 7*d.* per lb. The first draft included the whole of the May make; the second, those of June and up to July 20; and the third, all from that date up to the close of the School. Messrs. Hill Brothers, of Evercreech, were the buyers, and the quantity sold included the entire output.

COST OF SCHOOL.

The satisfactory prices obtained for the cheese and the steady influx of students enabled the Society to carry on the School at a less cost than was originally anticipated; the expenses (as shown in statement annexed) amounting to 1012*l.* 11*s.* 7*d.*, and the receipts (including the sale of cheese and students' fees) to 959*l.* 7*s.* 9*d.* It will have been seen that the locality visited bore a proportion of the cost of the Butter Schools, but the expenses of the Cheese School were entirely defrayed by the Society, who conducted the School without the assistance of a Local Committee.

STATEMENT showing the SOCIETY'S RECEIPTS and DISBURSEMENTS in connection with the CHEESE SCHOOL held at WELLS, from May 6 to October 31, 1890.

EXPENSES.	£	s.	d.
Milk	629	8	2
Students' and Teacher's Board and Lodging	106	6	6
Teacher	70	0	0
Bailiff	33	15	0
Plant and Fittings	48	15	1
Stewards' and Supervisors' Expenses	40	1	9
Printing, Advertising, Stationery, Postage and Office Expenses	48	8	5
Miscellaneous	35	16	8
Total .. .. £	1012	11	7

RECEIPTS.	£	s.	d.
Students' Fees	273	13	0
Cheese Sold	665	18	9
Allowance on Cheese-making Apparatus	19	16	0
	959	7	9
Net cost of School	53	3	10
Total .. .. £	1012	11	7

FUTURE ARRANGEMENTS.

In accordance with a strongly-expressed wish on the part of the Frome Agricultural Society, it has been arranged to open a Cheese School in April in the Frome District. The site selected is Vallis Farm, which is occupied by Mr. J. D. Armstrong, under the Earl of Cork. The dairy accommodation there is very suitable, and the house attached is modern and commodious, with ample accommodation for the students who will board and lodge there. The Committee will again have the advantage of Miss Cannon's services as teacher, and of Mr. Cannon's co-operation and help in the supervision and general arrangements of the School.

With a view to the encouragement of students, special prizes in money and plate, amounting to 52*l.*, are offered at the Bath Meeting in June next for cheese made by students who have received not less than a week's instruction at the Wells or Frome Schools.

The total cost to the Society (apart from the Local Committees) of its Butter and Cheese Schools, has been (after allowing for the Government Grants) 149*l.* 3*s.* 5*d.*; but it must be borne in mind that the Society has possessed exceptional facilities for working the Schools on economical lines, having an organization ready to hand, and much available help of a voluntary character. Only disbursements directly due to the establishment of the Schools have been included in the statements given of the cost, and no allowance has been made for rent and other offices expenses necessary for carrying on the Society's ordinary work as well as that of the Schools.

XIV.—*The History and Literature of the Bath and West of England and Southern Counties' Society.* By Jerom Murch, President of the Bath Literary Club, and a Vice-President of the Society.*

In the third quarter of the last century there lived in a small town in the county of Norfolk a worthy tradesman named Edmund Rack. He was a member of the Society of Friends, remarkably intelligent and public spirited, but by no means what the world would call well-to-do. Some change in his fortunes caused his removal to Bath, where he found scope for his literary ability, and by its means for public usefulness.

He settled here from Wymondham in the year 1775. Bath was fortunate in having an excellent printer and publisher, Mr. Cruttwell, who enlisted his services for the 'Farmer's Journal' and the 'Bath Chronicle.' In these Mr. Rack gave a series of articles on the agriculture of the district and the need of combined efforts for its improvement. At that time the science of farming had been attended to by only a few organised bodies, and those were small and distant. Three are mentioned in the annals of the period; they were at York, Norwich and Manchester, but their existence was comparatively short; very different from the longer life of the society Mr. Rack now contemplated.

His own interest in agriculture may be accounted for by his Norfolk experience. Everybody acquainted with that county knows how well versed its cultivators were, and still are, in farming matters. When I lived there sixty years ago Mr. Coke, afterwards Earl of Leicester, was enjoying a green old age in the midst of the beautiful farms he had created out of a vast rabbit warren. I used to hear of the rides he took every morning before breakfast, now looking in upon one tenant and now upon another, each one prosperous in consequence of his own generous spirit and noble example. No theme was then more common than his annual sheep-shearings, at which Holkham was crowded by the *élite* of the agricultural world and by intelligent tenant farmers who, year by year, carried back to their homes incentives of the greatest practical value to "work and learn."

Mr. Rack's well-written articles in the Bath papers had the desired effect. On the 8th of September, 1777, a meeting was held at the York House "for the establishment of a society," so the record runs, "for the encouragement and improvement of agriculture, manufactures, commerce and the fine arts." There

* A paper read before the Bath Literary Club on November 10, 1890.

were only 22 persons present, and they were chiefly local professional men, but the society was at once formed by the appointment of a Committee, with Mr. Rack as Secretary. Two months afterwards a larger meeting elected the principal officers including the Earl of Ilchester as President, and twelve gentlemen as Vice-Presidents; Lord Ilchester being then the only prominent county member. This accords with the title then fixed upon; it was simply the Bath Society, for the encouragement and improvement of agriculture, &c.; not until 1790 did it acquire the title of the Bath and West of England Society.

Mr. Rack was known from the beginning as the originator. The little band of founders were gradually joined by competent and influential men. The Chairman of the first general meeting was Sir John Miller of Batheaston, husband of the lady famed in these parts for her *poetic* revels.*

A constant attendant at Committee meetings was Mr., afterwards Sir Benjamin Hobhouse, who subsequently held the office of President for many successive years. Other workers were Dr. Parry, Dr. Falconer, Dr. Cogan, Mr. Billingsley and Mr. Wansey, all interested in science as applicable to agriculture, though little known as practical farmers. Special auxiliaries were engaged for various purposes, Dr. Priestley representing Chemistry;† Mr. Curtis, Botany; Arthur Young, General Husbandry; while such subjects as planting, fencing, farm servants, friendly societies and labourers' cottages were allotted to other authorities. The Duke of Bedford manifested so warm an interest in the Society, that the latter commissioned Nollekens to execute a bust of him, and also instituted a gold medal in his honour. Sir Benjamin Hobhouse, who, in addition to rendering valuable services, presented 100 guineas to the Society, ultimately received the compliment of a bust by Chantry. Both busts are now in the Bath Literary Institution. They are interesting and valuable as works of art as well as memorials of benefactors. Arthur Young won the first Bedfordian medal.

While admiring the width of those early plans we cannot avoid thinking that they were somewhat exacting. The very comprehensive views of the Committee of "Correspondence and Inquiry" went rather beyond the interest of the general public. The Committee issued, amongst other circulars, one

* Lady Miller had literary parties in the grounds at Batheaston, where poetic contributions were deposited in a sculptured vase, and prizes awarded according to their merit. The vase is now in the Bath Victoria Park.

† Dr. Priestley at this time filled the office of librarian to the Earl of Shelburne, at Bowood. He afterwards settled at Leeds, which caused the President of the British Association at the recent meeting in Leeds to eulogise his chemical discoveries.

to all the High Sheriffs of the Kingdom, with a list of queries as to the various modes of husbandry in their counties. Those gentlemen were requested either to return answers themselves, or to obtain them from others qualified to give the information. Again, when a zealous member of the Committee, Captain Williamson, announced his intention of making an agricultural tour, and invited suggestions as to any service he could render, the list he received would be thought overwhelming by modern tourists. It was divided under four heads: Agriculture, Manufactures, General Economy and Trade; there were twenty-three questions relating to Agriculture, thirteen to Manufactures, seven to General Economy, and five to Trade. Whether they were all answered does not appear. It is evident that the Secretary must have had a busy time with the numerous papers sent to him, and in attending to the various matters discussed by the Committee, which ranged from the establishment of a cloth-mart and the exhibition of stock to a machine for slicing potatoes and the construction of a rat-trap.*

The question of the cloth-mart has some historical interest. I have mentioned Mr. Rack's connection with Norfolk. This, and Mr. Coke's annual sheep-shearings, probably had some influence on the work of the Society. Mr. Coke's great object was to improve the quality of English wool, and good English wool was in constant request in and around Bath.

In mediæval times, and even down to the seventeenth and eighteenth centuries, Bath itself was a clothing town. Its ancient monastery had a shuttle for its coat-of-arms, and special civic privileges were granted to those who carried on the trade. Although the character of the city changed when the springs again came into fashion, the old industry, extending from Frome to Stroud, continued to flourish. What then more natural than that the founders of the Society should give special importance to the improvement of manufactures? Sir Benjamin Hobhouse was a clothier before he became a banker; Dr. Parry wrote and published frequently on the breed of sheep; samples of cloth sent by Lord Somerville and others were discussed at Committee Meetings. At one of these, reference was made to a correspondence with Sir Joseph Banks, President of the Royal Society, as to participation in a grant by George III. (then often designated Farmer George), "for pro-

* The following minute in 1779 shows how wide was the scope of the Society: "An inhaler for coughs and disorders of the lungs on Mr. Mudge's plan, but with some new improvements, being sent to the Committee, is referred to the inspection of some of the medical members, whose opinion will be acceptable at the next meeting." The coughs and disorders were not of cattle, as might be supposed, but of human beings.

moting the improvement of British wool." All this tends to explain the desire for a cloth-market at Bath, under the management of the Society. In December, 1806, the Secretary reported that he had contracted for a piece of ground near Kingsmead Square, suitable both for an annual exhibition of cattle and the erection of a cloth-hall. Within six months, just thirty years after the formation of the Society, the building was finished, the Corporation gave a formal sanction to the undertaking, and the first day of the public sale of cloth was advertised.

The acquisition of the site referred to offered facilities for exhibiting agricultural stock which were appreciated, and year by year the public interest in that department continued to increase. Within my own recollection—now embracing nearly sixty years—the winter shows brought a large number of visitors to the city. With reference to the earlier proceedings of the Society it must not be supposed that wool and cloth, often as they were discussed at Committee Meetings, excluded other subjects relating to agriculture generally. A zealous member of the first Committee, Mr. Lewin Tugwell, took especial interest in the improvement of the plough. Others raised discussions on draining and irrigation, on the culture of carrots and potatoes, and frequently on the Norfolk system of dibbling wheat. Many of these discussions originated in the reading of papers sent from various parts of the kingdom—a large proportion from Norfolk—and the best of these papers were afterwards printed in the Society's Journals. Besides the subjects I have already mentioned, those of planting, fencing, manuring, farm-buildings, cow-cabbage, labourers' cottages, and Friendly Societies all received attention, premiums being annually given to many of them.* It also appears that while the proceedings of the Society excited increasing interest in Great Britain they led to friendly correspondence with organised bodies on the Continent. In 1787 an eminent scientific gentleman at Lyons trans-

* The literature, as well as the history, of Agriculture repeats itself, and the Society's annals furnish many proofs that the burning topics of to-day are but revivals of those of yesterday. Like the poor, certain subjects seem to be always with us, for these volumes show that a century ago men's minds were exercised with regard to the potato-disease, the turnip-fly, foot-rot, allotments, tithes, and other matters that find a place in the agricultural columns of to-day. Special subjects, too, such as the question of growing beet for sugar in this country, which has lately come to the front again, were threshed out in the Society's publications long ago; and even tobacco-growing in England—a topic which was regarded by many as possessing all the charm of novelty when it was re-introduced a year or two since—had its possibilities discussed so far back as 1779, when the Bath and West Society appointed a Committee to consider it. They came to a very similar conclusion as have agriculturists of to-day, viz. that "the cultivation of that plant does not appear to be an object which, under the present Parliamentary restrictions, can be of public utility."—ED.

mitted certain papers on behalf of Societies in France, which led to an exchange of courtesies, the authors being elected Honorary Members of the Bath and West of England Society, whose Secretary was in return made an Associate of the Royal Agricultural Society of Lyons.

The subject of papers brings us to what I have termed the literature of the Society. That it should have a literature, might be expected from the tastes of its founders, who were chiefly men of intellectual culture, rather than practical farmers. Sir Benjamin Hobhouse, Dr. Parry, Dr. Falconer, Dr. Cogan, and the two first secretaries, Mr. Rack and Mr. Matthews, were all authors of works on various subjects. I have lately met with a remarkable volume by Mr. Rack, published in 1781. It is entitled 'Essays, Letters, and Poems,' and the author announces himself "Secretary to the Society." Whatever the literary merits of the volume may be, it is evident that Mr. Rack had a large number of friends, from the fact that the list of subscribers contains nearly five hundred names, many of them of great distinction in Norfolk, Suffolk, and Somerset. Amongst them I find Lord Walpole, Mr. Coke, and Arthur Young, of Norfolk and Suffolk; Mr. Graves, of Claverton, of 'Spiritual Quixote' fame; Dr. Parry, Dr. Falconer, and "Mr. William Herschel, Astronomer," of Bath. Some of these friends subscribed for twelve, fifteen, and twenty copies each, showing the esteem in which the founder of the Society was held. Mr. Matthews's work, 'The Recorder,' is chiefly theological, and by no means deficient in ability.

Arthur Young said to the Committee, at an early period of the Society: "By all means publish your Transactions; what you do is not for your own district alone, but for a much larger sphere." * Accordingly, within three years (in 1780), a volume appeared, one of a long series extending down to 1814. They contain a vast amount of information, on a great variety of subjects, of every-day interest to the practical farmer, written in good Saxon English by competent persons.

From these volumes I glean much of the information in this paper. Their chief source of interest in the present day is the means they furnish of comparing what was known and done,

* Among the Society's archives are several papers in the handwriting of Arthur Young, who was also connected, as its first Secretary, with another Institution, viz. the old Board of Agriculture, which was established in 1793. It is some testimony in favour of voluntary effort that the Bath and West Society should have outlived by so many years such an institution as the Board, when the latter had the active interest of the King, the support of such statesmen as Pitt and Fox, and the pecuniary help of the Government. The Board lacked the vitality necessary to give it length of days, for it ultimately died of sheer inanition in 1820, and comparatively few persons are now aware that it ever existed.—ED.

then and now. When the publication of the first series of the 'Journal' ceased there was a long interval of literary inaction. Probably the Secretaries who succeeded Mr. Rack and Mr. Matthews were better fitted for the ordinary duties of the Society than for those of the editor's chair. But in the year 1853 the 'Journal' was revived under different auspices and on a different plan. In addition to voluminous reports the first volume contained papers by the most prominent and influential members of the Society. The first paper was by Lord Portman, the President; the second by Mr. W. Miles, M.P., Vice-President; the third by Mr. Philip Pusey, with others by Mr. (afterwards Sir) T. D. Acland, Mr. Samuel Pitman, and Mr. Gabriel Poole. Since then, for nearly forty years, the 'Journal' has been published regularly, with what benefit to the agricultural world and credit to the Society the volumes amply testify.

There are many who are acquainted with the quiet perseverance, through long-continued ill-health, of the late Editor, Mr. Goodwin, but too little is known of the valuable aid steadily given, since the revival of the 'Journal,' by Sir Thomas Acland, who, as Chairman of the Publications Committee, has never spared pen, counsel, or stores of knowledge. He has lived to open new fields of usefulness in various ways; may he long be spared to see the fruit they yield!

If I had strictly followed chronological order I should have sooner mentioned another literary matter. In the year following the formation of the Society (1778), a report was presented to a General Meeting on the expediency of forming a Library. With the Hon. G. W. Fairfax in the chair, it was unanimously resolved to have "a collection of the best works on agriculture and rural affairs." The books at once ordered were Evelyn's 'Sylva,' the 'Farmer's Magazine,' a 'Dictionary of Agriculture,' the 'Universal Gardener and Botanist,' and others of the same kind.

The several Committees on Art, Commerce, Mechanism, and Manufactures were also requested to name at the next meeting what works they would consider desirable in their respective departments. In connection with the Library, it was shown that the aims of the Society with regard to Art were not forgotten. It happened that in 1805, an accomplished artist named Robins lived in Bath, possessing rare ability with but little encouragement. In fact, he was in great distress, from which he tried to relieve himself by the sale of two large folio volumes, containing nearly two hundred extremely beautiful paintings of flowers and insects, with scientific descriptions. The volumes had been valued at 100 guineas, and no one who could form an idea of the time and talent spent upon them would

think the estimate too high. But any such sum was of course beyond the means of the Society. The artist, however, pressed for whatever it could afford; so the Committee commissioned the secretary to offer 20 guineas, with the understanding that the work might be repurchased by Mr. Robins within two years. It was not repurchased, but is still the property of the Society.

The Library continued to grow steadily, additions not being limited strictly to books on rural affairs. Ultimately the number of volumes amounted to nearly a thousand, besides innumerable pamphlets. On the relinquishment of Hetling House, the books and busts were transferred first to the Bath Commercial Society and then to the Bath Literary and Scientific Institution. Here a catalogue was made, printed, and appended to the catalogue of the Institution, with a notice that the books would be accessible at all times to members of the Society.*

For seventy-three years, from 1777 to 1850, the Society held its Annual Meetings in Bath. The business was transacted at Hetling House, and the Stock exhibited in the Yard in Walcot. Prior to 1850, various events had modified the proceedings, and limited the interest in them to a smaller circle. The Founders had passed away; trade had gone to the North; a Cloth-hall was no longer needed; and small local agricultural societies were springing up as competitors. I remember being struck at the first meeting I attended—I think it was in 1834—with the dulness of the whole affair. There were a few of the good old friends—Mr. William Miles, Mr. Webb Hall, Dr. Charles Parry, Captain Scobell, and others—but they were poorly supported. In this state of things Mr. (afterwards Sir Thomas) Acland published a letter to Mr. Miles, advocating Annual Agricultural Meetings to be held successively in the chief towns of the West, and made attractive by large exhibitions, thus profiting by the example of the Roy. Agric. Soc. of Eng. lately established. He drew attention to a recent successful Meeting of that Society at Exeter, with such a display of implements as had never been seen before, and urged the adoption of similar means with a view to the education of the district in agricultural matters. At the suggestion of the late Lord Portman, Mr. Acland laid his views before the old Bath and West Society, and they were warmly supported by Mr. Benjamin Gray, a Vice-President, and one of its most active workers. In a great measure owing to his assistance the appeal

* I have mentioned that Mr. Matthews, like Mr. Rack, had literary qualifications. His death took place in 1816. The Committee with whom he had so long acted showed their respect for his memory by attending his funeral and yielding to a wish expressed by his executors and residuary legatees. It was that the sale of his own private library should take place in the large room at Hetling House.

succeeded; there was a cordial and general response, and the extension of the Society became an accomplished fact. The first Meeting on the new plan was held at Taunton in 1853, the second at Plymouth the following year; and eventually all the chief towns of the West were visited, with ever-increasing success, down to 1868. Then came a further extension, by an amalgamation with the Southern Counties Association, by which Hampshire, Berkshire, Oxfordshire, Surrey, Kent, and Sussex were added to the Society's area of operations. One of the most active promoters of this union of forces was the Hon. and Rev. Samuel Best. It was effected at a Special General Meeting at Yeovil, in August 1868, the Marquis of Bath presiding. This junction of forces was mainly due to the representations of the leading agricultural implement makers, who deprecated the existence of two large Associations for the Western and Southern Counties.

I have said but little about the chief workers in the Society from time to time, but it may be easily imagined how much is due to them. The subject was mentioned by several speakers at the hundredth anniversary, forcibly by the Earl of Cork, who said: "One of the great causes of the success of this Society was, that it had been always managed by thoroughly practical men, who had their heart and soul in the work. If it had not been for this, if the Society had been left chiefly in the hands of ornamental members meeting only once a year, it was very doubtful whether they would have seen the hundredth anniversary." *

The records of every period illustrate the truth of Lord Cork's remark. They show what was done in the earlier years by the Founders; in the middle time by men like Sir William Miles, Mr. Webb Hall, and Mr. Clement Bush; in later days by their successors. Those among the latter who are living I need not name; how thoroughly practical and energetic they are is well known. Long may they live to continue their good work! But some have passed away who cannot be forgotten. First and foremost among these is Mr. Jonathan Gray, the indefatigable Chairman of Plant, who was the oldest member of the Society; he and his father (Mr. B. Gray, already mentioned) belonged to it through the greater part of the century—I might almost say that he lived for it. He took a prominent part in the resuscitation and re-organising of the Society in 1852, and devoted himself from that time with untiring energy to forwarding its interests. Among many other services, he designed the Society's Art Galleries, which are still in use, and admirably adapted for their purpose. He started the first exhi-

* 'Annual Report,' vol. ix., Third Series.

bition of Poultry in connection with the Society in 1853 at the Plymouth Meeting, and, in order that the Society should run no risk of loss, he generously took the whole expense and responsibility upon his own shoulders. He managed it himself, and the result strikingly testified to his enterprise and foresight, as a profit of nearly 300*l.* was realised, which he at once handed over to the Society. He repeated the experiment the following year at the Bath Meeting, when there was a profit of 458*l.*, which he similarly dealt with. The Council then adopted Mr. Gray's suggestion that the Poultry Show should be included among the general attractions of the Annual Meeting without any extra charge to the public, instead of being a separate exhibition, and this has been most successfully carried out ever since.

Among others who will long be missed are Sir John Duckworth, whose counsel and experience were utilised with so much advantage to the Society; Sir John Walrond, whose help was so valuable to the Arts Department; and Mr. Boscawen, to whom the Horticultural Department owed so much.

It only remains to mention a few matters of recent date.

The union of the two societies has proved especially useful in giving a greater variety of places for the Meetings, a larger number of efficient members for the Council, and a more complete annual exhibition of agricultural produce and machinery.

The total number of members at the time of the last report was 1269; the subscriptions of members amounted to 1180*l.*, and the investments to 16,000*l.* That the investments ought to be maintained is obvious, for if there is on some Meetings a gain, there is on others a loss, and their educational influences are often needed most in sparsely populated districts.

The contributions of the towns where the Meetings are held have increased in proportion to the outlay. At the Taunton Meeting (the first of the migrations), the sum was 200*l.*; at the next four, 450*l.* each; then 700*l*, 800*l.*, 900*l.*, and 1000*l.* The usual contribution now is 800*l.* Large sums are given in prizes for Live-Stock and Dairy Produce, those offered in connection with the forthcoming Meeting at Bath amounting to upwards of 2800*l.* I have met with a memorandum by Mr. Goodwin stating that down to the time of the hundredth anniversary, celebrated in Bath in 1877, more than 60,000*l.* had been thus expended. Special prizes are often given by individuals and local committees. When the Art Department was instituted a considerable sum was subscribed for it, and the Society continues to make a large annual grant in furtherance of its objects.*

* See Appendix to 'Journal.'

The Society has of late years extended its sphere of usefulness in other directions, more especially by the institution in 1885 of a special department for conducting experiments on crops. This new development of the Society's operations was mainly due to Mr. J. E. Knollys and Sir T. D. Acland, through whose efforts the Council have been induced to vote considerable sums in aid. Under the superintendence of Mr. Knollys, as Chairman of the Experimental Committee, experiments which have been of great practical value to agriculturists generally, have been conducted in various parts of the kingdom.*

Further evidence of a desire to keep pace with the times is afforded by the facilities given by the Society for education in dairying. For some time past a fully-equipped Working Dairy has been a conspicuous feature in the Society's Showyard, and one whose field of operations has grown wider from year to year. Lectures, explanatory demonstrations, competitive trials of workers, and comparative tests of processes have here been the means for conveying practical instruction. The interest these excited created a desire for an extension of the Society's work in this direction, and it was felt that its organisation might be further utilised for teaching purposes. The recommendations of the Parliamentary Commission on Agricultural and Dairy Schools gave an opportunity to Sir R. H. Paget, the originator and Chairman of the Parliamentary enquiry, Sir T. D. Acland, Mr. Maskelyne, M.P., Mr. Knollys, Mr. Gibbons and others, to point out at the Society's Council Meetings how the Society might assist the carrying out of some of the conclusions at which the Commission had arrived. This resulted in the establishment of a migratory Butter School, which, since it started upon its travels in the autumn of 1888, has held successful sessions in eighteen different localities.

Thus encouraged, the Council established a Cheese School at the Palace Farm, Wells, which was open from May till the end of October last, and was very largely attended by students. These efforts of the Society in the cause of Technical Education in Agriculture have been recognised in a very gratifying manner by the Government Board of Agriculture, both in a Report presented to Parliament and by pecuniary grants.

* The 'Times' of Dec. 23, 1890, in an article on "Agricultural Shows and Agricultural Experiments," says:—"During the past week Mr. Charles Dyke Acland, of Killerton, Exeter, has issued a most important manifesto, in which he urges that a large portion of the money given for prizes at Shows could be much better spent in the purchase of manures, &c., and the renting of land for the purpose of agricultural experiments. These latter, thanks to the work of such bodies as the Bath and West of England Society (the real pioneers of their later and more useful development), the Royal Agricultural Society, &c., have become so popular and have done so much good, that their multiplication over the whole country seems now most desirable."

The subject of my Paper was suggested by the preparations for the Meeting in our city in the next year. It occurred to me that the Club would kindly accept such information as I should be able to collect and put together. That we are so fortunate as to have the President and Secretary of the Society as our guests this evening is extremely gratifying. How important to the Meeting will be their valuable aid and that of the other efficient officers in all departments I need not say. Let us hope for the chief element of success, propitious skies. Favoured by them, we shall look for a gathering to which Bath will be proud to give the heartiest welcome. And then the record of one more year will be added to the history I have endeavoured to sketch, one more year of the second decade of the second century, showing how vigour can increase with age, and success with earnest work.

XV.—*Taints in Milk and Butter; their Cause and Prevention.** By BERNARD DYER, B.Sc., F.C.S., F.L.S.

TAINTS or unpleasant or undesirable flavours in butter are derived from various sources. Some, such as the well-known "turnip flavour," are due to the use of certain foods undesirable for dairy cows. The use of turnips in more than moderate quantity is very liable to impart a distinct taste to milk; and the use of even a moderate quantity sometimes causes an ill-taste to appear in butter even when none is noticeable in the original milk. Certain herbs in pastures, too, are said to produce a bitter flavour in butter. Another class of taints is due to bad odours, such as those from dung-heaps, &c., in the near neighbourhood of the dairy in which the milk is set for cream, or in which cream is kept to ripen. Fatty substances of all kinds seem to have a peculiar aptitude for taking up such odours and retaining them, so that they are subsequently suggested to the sense of taste, if not of smell; and butter-fat is not an exception to the rule. Hence the necessity of keeping the dairy and all its surroundings sweet and clean. A dirty or sour-smelling sink in or near the dairy is sufficient to spoil the delicate flavour of the butter.

There is, however, quite another class of taints—taints which are not, like those already mentioned, apparent in freshly made butter, but which become developed more or less rapidly when it is kept. These are due to carelessness or lack of skill or judgment on the part of the dairy-maid, and the avoidance of

* Summary of a Lecture delivered in the Working Dairy at the Society's Rochester Meeting, June 5th, 1890.

them mainly constitutes good as distinguished from bad butter-making; and it is to the nature of these taints and the means of preventing their development that the present observations are devoted.

Milk, like most fresh animal and vegetable substances, is prone to alteration, more or less rapid, on being kept. If it could be drawn directly from the udder of the cow into a perfectly clean bottle in such a way as to exclude contact with any but chemically pure or filtered air, it would keep for a long time. But drawn as it necessarily is drawn, it comes at once in contact with ordinary air and the dust of the air; and that dust —the great quantity of which is very apparent to the eye in the track of an ordinary sunbeam—is laden with myriads of minute vegetable organisms and their spores or seeds, which organisms bring about change, decomposition, putrefaction or decay. In fact the changes, apparently spontaneous, to which most fresh animal and vegetable substances are liable, are due to the action of these organisms. A familiar example is that of the yeast organism which is employed in the brewery or distillery to convert sugar into alcohol; or the acetic ferment, an organism which converts alcohol into acetic acid, as when beer or wine goes sour, or in the process of vinegar-making. When milk turns sour it is due to another organism—the lactic ferment, which converts milk-sugar into acetic acid. [Diagrams showing enlarged microscopic views of these and other organisms were exhibited.]

Milk is a solution of various substances holding in emulsion the fat which constitutes butter. The percentage composition of ordinary average good milk is nearly as follows:—

Fat	3½
Casein and albumen	3½
Milk-sugar	4¾
Mineral matter	¾
Water	87½
	100

Of these constituents both the milk-sugar and the nitrogenous casein (and albumen) are essentially fitted to be the pabulum or nourishment of fermentative organisms, particularly as they are associated with a comparatively large proportion of mineral matter containing an abundance of potash and phosphates which encourage greatly the putrefactive or fermentative process.

The pure fat (or butter) of the milk is not in itself a substance likely to undergo rapid change. Yet we know very well that butter itself does sometimes change very rapidly,

developing rancidity or other properties which give it a disagreeable or even nauseous flavour. This is because, in butter, the fat is never wholly freed from the other substances, especially the casein, with which it was associated in the cream, and its keeping properties are very intimately dependent upon the extent to which the casein and other substances have been removed. Indeed, careful butter-making may be regarded as being all through of the nature of a war against the organisms that would spoil the butter if we did not make the conditions as unfavourable to them as possible.

As soon as milk or cream becomes sour, the curd separates out in flecks, or, as we say, the milk "curdles." These flecks or particles of curd, if we use sour cream, are, like the butter particles that aggregate in churning, solid, and they become entangled with the butter. If we merely wanted to make the best keeping butter we could produce, we should always churn our cream as fresh as possible, almost straight from the separator. But unfortunately we do not then get the fullest yield of butter, and we fail to get the peculiar flavour generally in request which is obtained when cream has ripened for a while. This very ripening of cream is a fermentative change, and we should only allow it to proceed for as short a time as will suffice to get a good flavour, and not keep the cream, as is so often done, until it has become highly sour and strong smelling. We cannot ripen it without its becoming a little sour, and some curd is then necessarily separated from solution, but, if the sourness is slight, the separated curd is in a state in which we can get most of it away in the butter-milk and washings. But if it is allowed to become very sour or over-ripe, then the particles of curd become tough, and it is practically impossible to avoid leaving far too many of them entangled in the butter, wash the latter as we may.

The use of brine in washing butter has a double object—one being to assist mechanically the washing out of the curd, and the other to render such particles as are unremoved less prone to decay—for salt, as we know, is a preservative or disinfectant, injuring or discouraging the growth of organisms.

Care, then, in ripening cream, prevents more contamination of the butter than is necessary with the separated curd particles; and careful washing, especially with brine, removes the bulk of those particles that are entangled with the butter grains, and disinfects, to a great extent, the rest. The thorough "working" of the butter to remove the diluted butter-milk which remains in even the last wash, is important chiefly for the same reason, viz. the removal of all the curd that can be got out, and with it the last traces of milk-sugar and mineral salts—in order

that there may be as little pabulum as possible for the organisms which, as they grow and multiply, produce tastes and odours which spoil the flavour of butter. Of course the ample salting of butter postpones these changes for a very long time, but salt masks the delicate flavour which gives its value to fresh butter. This flavour is only retained, as has been already said, by warring steadily against the organisms that would spoil it with flavours generated by themselves—and the weapons of warfare are disinfection of all dairy utensils with plenty of scalding water, the avoidance of over-ripening in cream, thorough washing of the butter accompanied by the judicious use of brine, and as thorough removal as possible of the last wash-water.]

Of course all these operations may be carried out, and we may get a perfectly well-keeping butter that is nevertheless "greasy" or of bad grain. That depends upon the skill with which the processes of churning, washing and working are carried out.

But, on the other hand, butter of excellent grain and, (when newly made) of capital flavour, often rapidly goes bad, and the lightest and neatest manipulation in working will not make good keeping-butter unless all the points just referred to are borne in mind.

Plenty of excellent butter-makers have never, of course, heard of ferments or organisms; but unconsciously, in their empirical work, learnt by experience, they are all the time warring vigilantly against these unseen and unknown little enemies. Some knowledge, however, of these enemies, of their number and of their power, of their strength and of their weaknesses, fortifies the learner by giving him intelligible reasons for the various precautions which are by common consent embodied in the rules for good butter-making.

XVI.—*The Ripening of Cheese—Its Nature and Control.**

By BERNARD DYER, B.Sc., F.C.S., F.L.S.

IN the Lecture on the causes of taints in butter, it was shown that these were generally produced by changes brought about by microscopically minute organisms or ferments, and the main point to be kept in view in butter-making was said to be to render as powerless or inert as possible the organisms with which we could not help milk and butter from becoming con-

* Summary of a Lecture delivered in the Working Dairy at the Society's Rochester Meeting, June 6th, 1890.

taminated. In cheese-making the case is altogether different. There we are altogether dependent upon organisms, for the ripening of cheese is effected wholly by organisms or living ferments of various kinds—some of them bacteria, some of them moulds. The flavour and texture of cheese are determined by the particular organisms present and the facilities afforded to one race or another to become dominant. It is the variety of the organisms, and the variation of the conditions in which they are placed, that account for the many kinds of cheese that can be made from one and the same raw material, milk. Not unfrequently we hear the special quality of the cheese of a given district attributed to special excellence in the local pasture. This notion (in the opinion of many) is not well founded. It is far more likely to be due in most cases to the special local prevalence of certain varieties of organized ferments. This view is supported by sound facts. It was formerly held that many foreign fancy cheeses could only be made in their native homes, attempts to imitate them elsewhere, even when the various steps of the process were carefully followed, having failed; the characteristic ripenings required did not take place—*and the characteristic moulds were not developed.* It has, however, been found that if the moulds are transplanted from one dairy to another and the proper conditions are then observed, the characteristic ripening required *does* take place—simultaneously with the growth of the characteristic moulds. Every one knows the difficulty of starting Stilton cheese-making in a dairy in which it has not been made before, and which is not in a Stilton district. The process of manipulation may be properly learned and faithfully imitated, and yet the desired flavour is not obtained. The cheese may be rich and good, but it is not a "real Stilton." Instances, however, can be now pointed to in which after previous failure the would-be Stilton maker has succeeded by adopting the scientific process of inoculating his curd with fragments of well-ripened Stilton cheese of first-rate quality from a good Stilton dairy, with the ultimate result that the necessary organisms have been acclimatised in their new home, and the making of Stilton has become a pronounced success. The very atmosphere of an old dairy is probably thronged with the germs of the organisms that have long been at work, hourly and daily and yearly, in its ripening room. Many of these organisms have been individually studied by biologists abroad, though little scientific work has been directed to them here, and the sum total of the knowledge yet gained about them is very small. But the mere discovery of the principle that specific ripening is caused by specific organisms working under specific conditions, apart from a

knowledge of individual species themselves, has already produced such practical results as these.

The recognition of the fact that we depend upon micro-organisms for the conversion of curd into cheese, and of the further fact that the culture of these organisms is greatly under our own control, at once imparts to the empirical processes of cheese-making an interest which to the intelligent dairy farmer they never previously possessed. It throws a new light upon his operations, and awakens observation and a desire for experiment in a far more systematic fashion than was formerly possible, and it is probable that in another half-century practical cheese-making will be as much controlled by scientific principles as is already the case in brewing, a process in which the study of micro-organisms and their effect has assumed a great regulating influence.

To illustrate how close is the correspondence between science and practice in some methods of cheese-making, we may briefly compare two different methods practised in Cheshire, viz. the production of old-fashioned late-ripening cheese, and that of the more modern early-ripening cheese. We will then see how the results arrived at in practice correspond with those which we should theoretically expect to happen from what is known of the general properties of organized ferments and of their work in producing organic changes more or less rapid —for the ripening of cheese is, as already said, essentially a series of organic changes wrought by living organisms.

In a dairy in which old-fashioned late-ripening cheese is made, the greatest care is taken to strain and rapidly cool the evening milk, to keep it cool all night and even to keep it covered till morning. The rennet is so proportioned as to produce a curd that will separate cleanly and firmly from the whey, very little acidity is allowed to develop, and the greatest possible care is taken to remove as thoroughly as possible the whey from the curd.

In making early-ripening cheese—we are considering, for contrast's sake, the case of very early cheese, such as ripens off in a few weeks (and it may be added rots if it is kept long after it is "ripe"), the milk of the evening is not cooled, and no special care is taken to shield it during the night from the air. By no means is the same jealous care taken in getting a clean firm curd, as is taken with late ripening cheese; acidity is allowed to develop freely, and the separation of the whey is not effected with anything like the same perfection—indeed much that might be removed is allowed to remain.

What should we, scientifically speaking, expect to follow, in each case? Milk, before it reaches the cheese tub, is already

largely infected by organisms from the dust of the air, like everything else that is exposed. If it is cooled down at once and kept cool, these organisms are kept in check and increase and multiply but slowly. But if the milk be left with its natural heat in it, to cool down spontaneously, its average temperature during the night will be far higher, and such as to favour the growth and multiplication of the organisms in it—the rate of whose increase under such conditions is enormously great. Furthermore, if it is at the same time freely exposed to the dust of the air, it is all night receiving a fresh access of germs. The consequence is that when the milk is "set" in the morning, the curd thrown down in the one case contains but few organisms, while in the other it contains probably many thousand times more. Each of these organisms that is entangled in the curd may be regarded as a starting-point for change or fermentation. Consequently it is easy to understand that this one difference of cooling or not cooling the night's milk may in itself be expected to enormously influence the rapidity of the "ripening" process. Then again, curd freed from whey is far less fermentable than curd containing it. It is the milk-sugar of the whey that in itself mainly nourishes many milk ferments, such as the lactic ferment and probably many more. By leaving the whey longer in contact with the curd and allowing it to sour, we breed a greater crop of these organisms than if we run it off quickly. And if, in addition, we drain and press the curd but imperfectly, we not only introduce into the cheese more organisms, but we give them more pabulum to feed on. In the one case we have a cheese composed as nearly as we can make it of curd and fat only with but little whey; in the other we have more whey left in, and consequently more milk-sugar and soluble saline matters—so that the whole mass to be ripened is not the same. We should not expect, therefore, the ripening process to be the same, apart from mere speed. And it is not. The fine flavour of old cheese is never developed in the extremely fast-ripening cheese we are now speaking of. Before the special and more delicate organisms that would give this flavour have time to do their work, the ground is occupied by the, so to speak, ranker and coarser organisms that by strength of numbers and of congenial food at once assume the mastery. A sort of parallel is found in the grass field. If we sow on a good old pasture coarse rank-growing grasses, they soon crowd out the finer and less vigorous grasses and overrun the field. Even if we do not sow rank grasses, but merely manure an old mixed pasture with heavy dressings of rich manure, like nitrate of soda, we know that the coarser and

stronger grasses will be so encouraged as to gradually crowd out the clovers and finer grasses. So, doubtless, it is with cheese—reading organisms for grasses, and whey and its constituents for manure.

When cheeses of intermediate ripening speed are made, it is by observing (or neglecting) such precautions as have been mentioned in an intermediate degree.

The hastening of cheese-ripening—within moderate limits doubtless a desirable thing in the eyes of many farmers—was arrived at gradually, but of course empirically and as the result more or less of accident followed by shrewd observation. Had the nature of cheese-ripening, however, been earlier understood, the manufacture of early ripening cheese might have been devised long before. As it is, the knowledge now possessed, limited though it is, enables the control of cheese-making to be effected far more intelligently than was possible before biology began to throw light upon the many interesting phenomena involved in it.

XVII.—*Notes on Butter-making Competitions.* By T. RIGBY.

THE following notes of some competitions seen during the year may, it is hoped, by comparison or deduction, help those who have been perplexed with some phases of their own butter-making at home, and interest perhaps a few others who are striving to improve, and to make the largest quantity of the best butter from the milk with which they have to deal.

The Bath and West of England Society has done very useful and valuable work in the Working Dairy of its Showyards for the last six years, and by its itinerant schools during the last three years. The steady increase of competitors, and the annually-improved quality of the butter made, proves the first part of the statement; and the willing reception by individual towns and centres of agricultural population of the pioneer teachers sent out by the Society, as well as the valuable instruction communicated, confirms its second part. If the quality of the butter made in 1883 in the districts visited could be compared with that made therein in 1890, the result would be more in favour of the latter than is generally thought.

A showyard competition encourages hand-training chiefly. Classes, with lectures added, teach principles and the application of facts. These interest and inform the mind, and ensure more regular results.

Although a competition may be very useful, its teaching really

is only one or two steps above the rule of thumb. The competitor learns the temperature at which churning should begin, and the use of a thermometer; how to work the air-valve, and when to stop churning by sight; how to wash the butter in the churn; how to press out all water and milk on the butter-worker; and how to salt the butter and make it up in a uniform manner. But the eye and hand only are taught by this.

The teaching of the class goes further, and assists the manipulative skill of the dairymaid by bringing the intellectual faculties into play. It points out what are the constituents of milk; its susceptibility to outside odours; how the ripening for churning is brought about; the need of pure water; and the reason why the careful cleansing of all dairy utensils is so necessary. The intuitive perception of the female mind enables her to easily understand these teachings. Indeed, some dairymaids seem to make the best butter and the best cheese without any trouble. Have they a natural gift for it, or is it a family heritage? It is sometimes said, half in earnest and half in jest, that dairy skill runs in families. This may be true, but it is nowhere so perfect that it cannot be improved by a study of principles, by watchfulness, by a careful noting of results, by accuracy of deduction, and by scrupulous cleanliness with regard to all vessels used, and to the dairy premises also.

The following are some other points which present themselves for consideration:—1st. The quality of the milk as soon as drawn. This varies more than is thought. The normal composition of milk may be stated as 87·5 per cent. of water, 3·5 albuminoids, 3·3 oil (fat), 5·0 sugar, and 0·7 mineral matter; but it does not all consist of such proportions. Milking cows give richer or poorer milk according to their age, period since calving, the quality of pastures they graze in, or the kind of food with which they are fed in the house. Cows fed in the pastures of Derbyshire give the best results for the milk-seller, and perhaps for the Derby cheese-maker. The quantity is abundant, but the solids in it are small. The milk of a herd of Derbyshire cows, when the herd was moved into Leicestershire, was reduced in quantity by one-third, but the milk yielded as much weight of cheese, when it was made into Leicester cheese, as it had done in Derbyshire.

To know how best to use milk for manufacturing into cheese or butter, implies ability to define its proportionate parts by chemical analysis or by some practical tests.

A second point is to ripen cream rightly, not too much nor too little. The best results, both as to quantity and quality of butter, depend largely on this; but there is very little known of the degree of ripeness it is best to attain. It is probable

that the results of churning might be regulated by this knowledge as much as, or more than, by the thermometer.

How is it that the time taken in churning varies so much at competitions? Some dairymaids finish churning in 15 minutes, while others take 40 and even up to 100 minutes, in the same building, and with very little, if any, variation in temperature of the cream when churning is begun; and I have seen the same dairymaids take from the shortest to the longest periods in different places. The milk of long-calved cows, which are just drying, can scarcely be churned alone at all, but the addition of some cream from a fresh-calved cow's milk enables it to be brought into butter as usual.

There is much in this question of fixing the proper degree of ripeness. It would be worth a great deal if ripeness could be determined as easily as the temperature of the milk is determined by the thermometer. A near approach to the detection of the degree of acidity in milk at various stages was made in Class 136 at Rochester, but something more easily and more quickly applicable is wanted. It is a subject worthy the chemist's art and skill, and meanwhile the dairymaid might help by experimenting, by trying this way and that, and by trying again and again.

The next important matter which wants proving is—whence comes the increase in weight of butter obtained by some competitors over others; it is not always explained by bad workmanship, leaving water in, or not washing butter-milk out. Sometimes, with equally dry butter, there is a great difference in weight, as for instance between 9 lbs. 11½ oz., the heaviest in a competition of 8 persons, and 9 lbs. 5½ oz., the lightest.

In another instance, 4 lbs. 13½ oz. was the highest, and 4 lbs. 8 oz. the lowest, in a competition of 22, and there were four who had the lowest weight. In a third, 6 lbs. 12½ oz., was the highest, and 6 lbs. 8 oz., the lowest; and in a fourth, 7 lbs. 14½ oz., the heaviest weight, and 7 lbs. 7½ oz., the lowest, in a competition of six persons, and these were all prize-winners on previous days. Take the average difference of these, and apply it to the whole butter produce of a single farm in one year, or to that of a single township's farms, or to the produce of a county, and what a loss is manifest! Who would not wish to have the heaviest weight at every churning?

It will be understood that the quantity and the quality of the cream were not the same in all the cases quoted. Each trial is comparable in itself, but a comparison must not be made of results all round. Particular care was taken, by keeping the whole cream well stirred, to give the same quality

of cream to each competitor, and the same quantity, proved by measuring one quart into a can for each churn one after another until the number intended to be given out was made up, and then each can (the tare of which had been carefully ascertained) was weighed to precisely the same nett weight.

The heaviest weight of butter may be obtained from ceasing to churn early as soon as the butter has come into granules like pin-heads or round oatmeal; by washing it thoroughly, but with as little water and working as possible; and by pressing out the water gently but effectually, not rudely or roughly. There is a way of doing such work thoroughly without leaving much trace of doing it behind. There is, in surgery, a great difference between a steady, confident hand and a doubtful, nervous, half-afraid operator; and there is in butter-making more probability of damaging the butter with hard noisy smacks than by well-directed but quiet strokes. "It is the lightning that kills, not the thunder," and I have now and again turned away from a dairymaid who was beating the butter as if it were a naughty child, and she delighted to use the rod, to another who was doing her work quietly and with better results. The colour, the grain, and the aroma are all best kept in this way, and these points always help greatly in winning prizes.

Some other questions, not yet fully answered, showing the importance of study, I compress into one more paragraph, and the last.

Whence can we get the best and the most butter—from churning whole milk duly ripened, or from churning the cream only? From the Devonshire scalding system, or from the Danish ice system? From the Jersey-creamer method of setting milk? the old-fashioned shallow pan? the modified adoption of both plans? or from the mechanical cream-separator worked by power—manual or steam? Shall we salt the butter, or shall we brine it? Shall we feed the cows with corn or cake while milking? how treat their milk as soon as drawn? how drive them to and from pasture? and in winter how best care for their health and their productiveness? There is a right and a wrong way of doing all these things. Each may make but a very slight difference in the result, yet all of them together, when not done the best way, will probably mean trouble, anxiety, and failure. My note-books say of some competitors in various trials: "wasteful of butter," "sloppy," "rough," "over-confident," "doing best to win," "does not think enough to win." Lastly, one note—not the least in importance—should be written large in every competitor's mind, viz., "nothing without labour and thought."

XVIII.—*Mangold Experiments*, 1890. *Report of the Experimental Committee.* By J. E. KNOLLYS, Chairman.

'HE Field Experiments carried out this year—1890—have been pon the growth of Mangolds.

Their object has been "to ascertain what manures can be" most advantageously used for the production of a good crop of" mangolds, having regard also to their effect upon a succeeding" crop of corn."

It is well known that with a good dressing of dung, and the ldition of some of the special mangold manures prepared by rms of high character and standing, good and heavy crops of ıangold are constantly grown; but the question arises whether, oth as to the quantity of dung and the cost of artificial manure, more economical method may not be ascertained, and one hich is less liable to expose the farmer to the purchase, under specious name, of very poor stuff at a high price; for, unfortuately, all manure merchants and their agents are not of the igh standing indicated above.

But desirable as it is to save more dung for manuring the rass-lands or other parts of the farm, the saving would be of uestionable value if it has the effect of reducing to any material xtent the yield of the crop of corn succeeding the mangolds. onsequently our Experiments are incomplete until it is seen ow the reduction of the quantity of dung in some of the plots, nd its entire omission in others, affects the yield of corn to be rown on these plots next year.

The Plan of the Experiments, the sorts and quantities of nanures used, and the method of their application, will be best nderstood by the following reprint of the conditions under hich the Experiments have been made:—

1. *The Experiments to be on land of even quality, upon which wheat or some other corn has been harvested in* 1889, *and which is intended to be again sown with corn in* 1891.*

* On light chalk and some other soils, mangolds are no doubt grown with reater advantage after swedes folded off; but it was requisite that all the xperiments should be tried under the same conditions.

2. *The Experimental Plots are to be arranged and manured as in the accompanying Diagram, and to be a quarter of an acre in size.*
3. *The Experiments will consist of two classes:—*
   a. *Where dung is used, either by itself or with the addition of artificial manures.*
   b. *Where artificial manures alone are used.*
4. *The dung may be applied at the time and in the manner ordinarily practised by the Experimenter, care being taken that all the dunged plots are given the same quality of dung and the quantity specified in the diagram.*
5. *Where nitrate of soda, after the rate of 2 cwt. per acre is used, it should be applied as top-dressings, half as soon as the plants are singled, and half when the bulbs are well advanced (probably in August), at the discretion of the Experimenter.*
6. *Where nitrate of soda, after the rate of 4 cwt. per acre, is used in combination with other manures, one-fourth of it should be mixed and applied with them at the time of sowing the seed, and the remainder used in either two or three top-dressings at the discretion of the Experimenter. Where nitrate of soda, after the rate of 4 cwt. per acre is used alone, one-fourth should be applied at the time of sowing and the remainder as top-dressings as above mentioned.*
7. *In Plot K, where sulphate of ammonia is to be used after the rate of 3 cwt. per acre, two-thirds are to be applied at the time of sowing the seed, and the remainder as a top-dressing as soon as the plants are singled.*
8. *The dates of sowing and the application of top-dressings to be carefully recorded.*
9. *The mangold to be weighed in the state in which it would be ordinarily stored free of earth and tops.*
10. *A space of about 2 feet should be left between each plot of mangolds, and the boundaries securely marked by pegs, with the object of observing the effects of the manures upon the succeeding corn crops.*

N.B.—The same sort of mangold should of course be grown on each of the 12 Experimental Plots.

The artificial manures (applied at the time of sowing) can be mixed together, and either sown broadcast over the plot on which they are to be used, or drilled with the seed.

Diagram showing arrangement of Plots and Manures to be applied, at the several rates per acre thereon named.

A.	B.	C.	D.	E.	F.
Dung, 20 *loads.*	*Dung,* 10 *loads.* *Nitrate of Soda,* 2 *cwt.* *Mineral Superphos.,* 4 *cwt.*	*Dung,* 10 *loads.* *Nitrate of Soda,* 2 *cwt.*	*Dung,* 10 *loads.* *Nitrate of Soda,* 2 *cwt.* *Common Salt,* 4 *cwt.*	*Dung,* 20 *loads.* *Mineral Superphos.,* 4 *cwt.*	*No manure.*

ROAD WAY.

G.	H.	I.	K.	L.	M.
Nitrate of Soda, 4 *cwt.*	*Nitrate of Soda,* 4 *cwt.* *Mineral Superphos.,* 4 *cwt.* *Common Salt,* 4 *cwt.*	*Nitrate of Soda,* 2 *cwt.* *Mineral Superphos.,* 4 *cwt.* *Common Salt,* 4 *cwt.*	*Sulph. of Ammonia,* 3 *cwt.* *Mineral Superphos.,* 4 *cwt.*	*Nitrate of Soda,* 4 *cwt.* *Mineral Superphos.,* 4 *cwt.*	*No manure.*

NOTE.—*The above quantities are the rate* per acre *of the several manures. As the plots will be a quarter of an acre, one-fourth of the above quantities will of course only be required.*

It will be observed, on reference to the diagram, that the comparisons afforded by the several plots are many.

1. A general comparison between the plots having dung and those without.
2. Between a full dressing of dung alone, and the same quantity of dung with mineral superphosphate only added—A and E.
3. Between the above two plots and B, C, and D, where a half dressing of dung is supplemented by 2 cwt. of nitrogenous manure in the form of nitrate of soda.
4. Between C and B, and C and D, to observe whether mineral superphosphate or common salt, added to nitrate of soda, is the more effective, or whether either are wanted.

Then as to the plots without dung we get a comparison—

5. Between 4 cwt. nitrate of soda alone in G, as against the same quantity in H, with the addition of mineral superphosphate and common salt, and the same quantity in L, with mineral superphosphate alone added.
6. Between 4 cwt. nitrate of soda in L, and 3 cwt. sulphate of ammonia in K, with the same quantity of mineral superphosphate in both.
7. Between 4 cwt. nitrate of soda in H, and half the quantity in I, with the same addition of mineral superphosphate and salt in both cases.
8. Between the produce of the unmanured plots F and M, and that of each of the other plots—the average of the two plots F and M being taken for this comparison.
9. And lastly, a consideration of the comparative cost at which an increased yield over the unmanured plots has been obtained.

These experiments, twenty-five in number, have been carried out in the following counties:—

Cornwall.	Hereford.
Devon.	Wilts.
Somerset (West).	Hants.
Somerset (East).	Kent.
Gloucester.	Surrey.

In two cases (Nos. 9 and 14) land already manured with dung could alone be obtained, but in twenty-three others the whole series has been carried out.

H. M. Inspector, on behalf of the Board of Agriculture, visited some of the Experimental Stations in September, and expressed himself much pleased with the system adopted and the careful manner in which the Experiments were conducted. And in October and November the whole of the Experiments (with one exception only) were carefully inspected by Mr. Cyprian Knollys, and notes made of the appearance of the several plots.

The peculiar season of 1890 has had a marked influence on the growth of mangolds. The want of heat in the summer months told seriously against their advance during July and August, but at all our Stations the unusual warmth of September, October, and the early parts of November, brought on the backward plots, and increased the size of the bulbs generally.

Contrary to that which I myself in common with many others expected, and contrary to Dr. Voelcker's Experiments in 1862, referred to hereafter, the three plots dressed with salt ripened

earlier than the others—their leaves turning yellow, while others (K and L especially) were dark green and growing fast up to the time the roots were pulled. This early ripening of the plots dressed with salt is a feature which should be watched in any subsequent Experiments. The plots having the full dressing of dung, A and E, also in several instances ripened earlier than B, C, and D with half the dung.

The details of each Experiment will be found on pp. 174–223, with information as to the previous cropping and some notes as to the appearance of the crop at different periods. As will invariably be found in agricultural experiments, however carefully conducted, there are some results which cannot be explained and which are contradicted by others, but the general results obtained from a large number of Experiments cannot be far wrong, and it is in the fact that this Society has been able to obtain so large a number of careful Experimenters that the results stand alone, and speak with an authority which cannot be attached to individual efforts.

Taking then the average produce of the twenty-three Experimental Stations, the result in order of merit is as follows:

			Tons	cwts.	lbs.
1.	H.	Nitrate of Soda, 4 cwt.; Mineral Superphos., 4 cwt.; common Salt, 4 cwt.	29	0	88
2.	I.	Nitrate of Soda, 2 cwt.; Mineral Superphos., 4 cwt.; common Salt, 4 cwt.	27	0	37
3.	D.	Dung, 10 loads; Nitrate of Soda, 2 cwt.; common Salt, 4 cwt.	26	18	34
4.	L.	Nitrate of Soda, 4 cwt.; Mineral Superphos., 4 cwt.	26	11	105
5.	B.	Dung, 10 loads; Nitrate of Soda, 2 cwt.; Mineral Superphos., 4 cwt.	26	7	62
6.	C.	Dung, 10 loads; Nitrate of Soda, 2 cwt. ..	25	6	95
7.	G.	Nitrate of Soda, 4 cwt.	24	14	40
8.	E.	Dung, 20 loads; Mineral Superphos., 4 cwt.	24	9	96
9.	K.	Sulph. of Ammonia, 3 cwt.; Mineral Superphos., 4 cwt.	24	6	71
10.	A.	Dung, 20 loads	23	10	31
		Average of the two Unmanured Plots ..	15	14	48

From this it will be seen that the three salt plots stand at the head of the list, and A, with twenty loads of dung, at the bottom. But a more perfect view will be gained of the relative advantages of the different dressings by reference to the two following Tables, in which is shown not only the increased weight gained over the unmanured plots, but the cost per ton at which that increase has been obtained, and there again the plots with a heavy dressing of dung show to a great disadvantage. I have put the price of this dung at 4*s.* 6*d.* a load, which will not, I think, be considered excessive.

DUNGED PLOTS.

TABLE showing the AVERAGE PRODUCE per acre of the five DUNGED PLOTS on Twenty-three different STATIONS, also the increase obtained beyond the average of the two UNMANURED PLOTS, F and M, and the cost per ton of MANGOLD of this increase.

Plot.	Manure and cost per acre.	Average produce of 23 Plots.			Increased weight over F and M.			Cost per ton of this increased weight.		
		Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	£	s.	d.
A	20 loads Dung. £4 10*s*.	23	10	31	7	15	95	0	11	6
B	10 loads Dung. 2 cwt. Nitrate of Soda. 4 cwt. Min. Superphos. £3 16*s*. 6*d*.	26	7	62	10	13	14	0	10	2
C	10 loads Dung. 2 cwt. Nitrate of Soda. £3 3*s*. 6*d*.	25	6	95	9	12	47	0	6	7
D	10 loads Dung. 2 cwt. Nitrate of Soda. 4 cwt. Salt. £3 8*s*. 6*d*.	26	18	34	11	3	98	0	6	1
E	20 loads Dung. 4 cwt. Min. Superphos. £5 3*s*.	24	9	96	8	15	48	0	11	9

N.B.—The average produce per acre of the two Plots without Manure is 15 tons 14 cwts. 48 lbs.

PLOTS WITHOUT DUNG.

TABLE showing the AVERAGE PRODUCE per acre of the five PLOTS without DUNG on Twenty-three different STATIONS, also the increase obtained over the average of the UNMANURED PLOTS, F and M, and the cost per ton of MANGOLD of this increase.

Plot.	Manure and cost per acre.	Average produce of 23 Plots.			Increased weight over F and M.			Cost per ton of this increased weight.
		Tons.	cwts.	lbs.	Tons.	cwts.	lbs.	£ s. d.
G	4 cwt. Nitrate of Soda. £1 17*s.*	24	14	40	8	19	104	0·4·1
H	4 cwt. Nitrate of Soda. 4 cwt. Min. Superphos. 4 cwt. Salt. £2 15*s.*	29	0	88	13	6	40	0·4·2
I	2 cwt. Nitrate of Soda. 4 cwt. Min. Superphos. 4 cwt. Salt. £1 16*s.* 6*d.*	27	0	37	11	5	101	0·3·3
K	3 cwt. Sulph. Ammonia. 4 cwt. Min. Superphos. £2 10*s.* 6*d.*	24	6	71	8	12	23	0·5·10
L	4 cwt. Nitrate of Soda. 4 cwt. Min. Superphos. £2 10*s.*	26	11	105	10	17	57	0·4·7

N.B.—The average produce per acre of the two Plots without Manure is 15 tons 14 cwts. 48 lbs.

In 1862 the late Dr. Voelcker tried an Experiment with salt on mangolds on some strong land attached to the Cirencester College, and the conclusion he arrived at was that it was prejudicial rather than otherwise. In the following year he tried it on light sandy land with marked advantage, and came to the conclusion that it was good for the one but not for the other.*

This, however, has not been the case in our Experiments, as on reference to the tabular results obtained from the eight stations on land more or less heavy (Nos. 4, 8, 11, 12, 17, 18, 19, 25) it will be seen that the effect has been generally advantageous, giving an average increase on the plots dressed with salt of—D, 10 tons 2 cwts. 28 lbs.; H, 14 tons 3 cwts. 108 lbs.; I, 8 tons 19 cwts. 62 lbs.

But in speaking of agricultural enquiry Dr. Voelcker guards us against relying upon single or individual Experiments, and speaks strongly on the great advantage to be obtained from a large number of Experiments carefully conducted in different localities by practical men.† How his heart would have been gladdened if he could have seen our present Bath and West of England work!

Now if the reader will refer to the comparisons instituted on p. 165, I think he may take the following as the answers:—

1. That both in larger produce as well as in smaller cost the plots without dung have the advantage.
2. That the addition of mineral superphosphate alone to a full quantity of dung has given a slight advantage (A and E).
3. That half the quantity of dung, with 2 cwt. nitrate of soda added, has given a better result (B, C, D) than a full dressing of dung.
4. That the further addition of mineral superphosphate in B and of salt in D has given in each case an increase of crop, the salt rather the larger (C and B, C and D).
5. That the addition of mineral superphosphate and salt to 4 cwt. nitrate of soda in H, and of mineral superphosphate (without the salt), in L, have each produced heavier crops than 4 cwt. nitrate of soda alone in G.
6. That 3 cwt. sulphate of ammonia in K has not done so well as 4 cwt. nitrate of soda in L, each having the same addition of mineral superphosphate.
7. That 4 cwt. nitrate of soda in H has produced 2 tons more mangolds than half the quantity in I, but that the increase obtainable from 4 cwt. appears to be less in proportion than that obtained from 2 cwt.

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* 'Roy. Ag. Soc. Journ.' vol. xxv. Pt. 1.
† Ibid. vol. xx. Pt. 2.

With reference to this last reply, and to the relative cost of increase of crop on H and I, it must be borne in mind that the farmer wants a certain quantity of mangold, and that the smaller area from which that quantity can be produced the more economical is the process. Within reasonable limits, therefore, it is better even at an increased cost for manure to get a larger crop, than to have to plough, sow, and keep clean a larger number of acres.

8 and 9.—The Tables on pp. 168, 169 give the replies to these comparisons, and show in a condensed form the relative advantages of the several dressings.

The Experiments therefore point very forcibly—so far as the mangold crop alone is concerned — to the advantage which artificial manures in proper combinations, either by themselves or with small quantities of dung, have over large and heavy dressings of dung.

But we have yet to see what will be the effect upon the succeeding crop of corn, and until we learn this our Experiment is incomplete.

It must also be remembered that we have had to deal with a very exceptional season, and that a different season may tell a different tale. Under these circumstances, and with the general concurrence of those who have so carefully conducted this year's Experiments, it has been decided to repeat them next season (1891); and together with the results then obtained, to furnish analyses of the comparative feeding properties of the roots grown by the several manures.

I am indebted to many of our Experimenters for very interesting notes, and though in this Report I have deemed it right to lay stress on the general rather than the individual results, these notes have yet been of material assistance to me.

In concluding this Report I beg to tender, on behalf of the Committee and myself, our sincere and hearty thanks to all those who have so kindly carried out these Experiments.

On behalf of the Committee,

J. E. KNOLLYS,

Chairman.

NAMES of PERSONS carrying out the MANGOLD EXPERIMENTS, 1890, with a DESCRIPTION and SITUATION of the EXPERIMENTAL PLOTS.

	Owners, Agents, or Occupiers.	Situation.	Soil.	Subsoil or Geological Formation.
	WESTERN AND SOUTH-WESTERN COUNTIES.			
	Cornwall.			
1	Sir T. D. Acland .. .. .. / Mr. W. H. Tremaine	Trerice, near St. Columb	Stone rush, light and dry	Devonian
2	Mr. W. H. Magor	Benallock, Probus	Light and dry	Clay slate
	Devon.			
3	Sir T. D. Acland .. .. .. / Mr. Stevens	Broad Clyst, near Exeter	Sandy loam	New Red Sandstone
4	Hon. Mark Rolle .. .. .. / Mr. R. Carter	St. Giles, near Torrington	Mild clay on stone	Devonian
	Somerset (West).			
5	Mr. Alfred C. Skinner	Bishop's Lydeard, Vale of Taunton	Deep sandy loam	New Red Sandstone
6	Mr. Knollys	Fitzhead, near Milverton	Sandy loam	New Red Sandstone
7	Mr. John Kidner	Nynehead, near Wellington ..	Loam on clay	Edge of New Red Sandstone
8	Mr. Samuel Kidner	Oake, near Milverton	Heavy land, well drained	Marl
9	Mr. J. Dredge	Cutsey, near Wellington	Red marl	Flint stone and clay
10	Sir T. D. Acland .. .. .. / Mr. C. Birmingham	Holnicote, near Minehead	Stone rush on gravel	Devonian
	Somerset (East).			
11	Mr. George Gibbons	Tunley, near Bath	Lias	Clay
12	Capt. J. D. Sherston	Evercreech	Lias clay	Limestone

	Gloucester.			
13	Mr. T. D. Till	Thornbury (on the Hill)	Light and dry	Old Red Sandstone
14	Mr. E. Eden Jones	Winterbourne, near Bristol	Light loam	Red Marl
	Hereford.			
15	Mr. W. V. Bonnor	Near Ross	Free working	Old Red Sandstone
16	Mr. John Bennett	Near Ross	Light and dry	Dun Stone
	SOUTHERN AND SOUTH-EASTERN COUNTIES.			
	Wilts.			
17	Sir Gabriel Goldney .. .. / Mr. H. B. Napier	Lyneham, near Wootton Bassett ..	Strong loam	Coral Rag Limestone
18	Mr. Story-Maskelyne, M.P. ..	Bassett Down, near Swindon ..	Marl	Chalk Marl
19	Mr. H. Richards	Charlton, near Shaftesbury ..	Clay loam	Hard Chalk
20	Professor Wrightson	Downton, near Salisbury	Good dry loam	Gravel
21	Messrs. C. and T. Coles ..	Winterbourne Stoke, edge of Salisbury Plain.	Gravelly loam	Chalk
	Hants.			
22	Mr. East .. .. / Mr. R. Hewett	Leckford, near Stockbridge ..	Light chalk	Chalk
	Surrey.			
23	Mr. Bryant Marshall	Godalming	Light sandy loam	Lower Greensand
	Kent.			
24	Mr. Henry Brassey .. .. / Mr. R. A. H. Seymour ..	Preston Hall Farm, Aylesford ..	Dry loam	Kentish Rag
25	Mr. Wm. Ashcroft	Hayes, near Beckenham	Clay, mixed with chalk	Clay on Chalk

No. 1.—Sir T. D. ACLAND.

Plot.	Manures per Acre.	Cost of Manures per Acre. £	s.	d.	Produce per Acre. Tons	cwt.	lbs.
	Plots with Dung.						
A	20 loads Dung (4*s*. 6*d*. per load)	4	10	0	20	0	0
B	10 loads Dung .. .. ..

No 1.—Sir T. D. ACLAND'S EXPERIMENTS, West Cornwall, near St. Columb.

Previous Cropping.

1885. Roots (3 cwt. Dissolved Bones; 2 cwt. Superphosphate).
1886. Barley, seeded.
1887. Seeds, mown (16 loads Dung).
1888. Second year's Seeds.
1889. Wheat (1 cwt. Nitrate of Soda).

Cultivation for Mangold.

Dunged.—In April.
Sown, and First Artificials.—May 23.
Top-dressed.—July 14, August 29.
Soil.—Light and dry, Stone rush.

Mr. Tremaine speaks very decidedly of the need of Phosphates on this soil, and states that from the first the Plots having Superphosphate took the lead and kept it throughout. He also considers that on land at this short distance from the sea, Salt is but little wanted. The plants on F and M failed for want of manure.

No. 2.—Mr. W. H. MAGOR.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	37	5	80
B	10 loads Dung .. .. ..

No. 2.—Mr. W. H. MAGOR'S EXPERIMENTS, West Cornwall, Probus.

Previous Cropping.

1885. Second year's Seeds (dunged).
1886. Third year's Seeds, mown (3 cwt. Guano).
1887. Fourth year's Seeds, mown (1½ cwt. Guano, 1 cwt. Nitrate of Soda.
1888. Wheat (no manure).
1889. Barley (Bath and West of England Experiments).

Cultivation for Mangold.

Dunged.—2nd week in May.
Sown, and First Artificials.—May 14.
Top-dressed.—June 28, July 31, August 29.
Soil.—Light and dry on Clay Slate.

This land is evidently in very high condition, but still responded to manure. Mr. Magor states, that A had a thinner plant than the other Plots (pointing to the want of Superphosphate); that the Salt Plots ripened first, and that K and L continued their growth longer than any of the others, having more top and also more fibrous roots.

No. 3.—Sir T. D. ACLAND.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	24	15	0
B	10 loads Dung .. .. ..

No. 3.—Sir T. D. ACLAND'S EXPERIMENTS, Devonshire, near Exeter.

Previous Cropping.

1885. Wheat (1½ cwt. Superphosphate; 1 cwt. Nitrate of Soda).
1886. Turnips, fed (2 cwt. Dissolved Bones; 3 cwt. Superphosphate).
1887. Oats, seeded; Seeds, dunged (8 loads).
1888. Clover, cut for Hay.
1889. Wheat (¾ cwt. Nitrate of Soda).

Cultivation for Mangold.

Dunged.—March 1890.
Sown, and First Artificials.—May 12.
Top-dressed.—July 5, August 18.
Soil.—Sandy loam. New Red Sandstone.

Mr. Stephens says that the plants in H, I, and K came up thinly, and suffered more than others from a heavy downpour of rain on 25th May, and that he filled up some of the vacancies by transplanting. On 1st September he reported D as best; H now promising well; L with a regular plant, and growing well from the first, but with a less vigorous top than the salted Plots; K losing its unhealthy appearance, but dwarfed in growth.

No. 4.—Hon. MARK ROLLE.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	19	13	0
B	10 loads Dung .. .. ..

No. 4.—Hon. MARK ROLLE'S EXPERIMENTS, Devonshire, near Torrington.

Previous Cropping.

1885. Oats.
1886. Oats.
1887. Swedes.
1888. Oats.
1889. Oats.

Cultivation for Mangold

Dunged.—Just before sowing.
Sown, and First Artificials.—May 1, 2, 3.
Top-dressed.—June 23, August 19.
Soil.—Mild Clay on Stone.

Mr. R. Carter reports that, up to 1st July, the dunged Plots were doing best. E being first, and then A and B.

On 1st September he considers H as the best; L, second; E, third.

The continuous growth of L in the warm autumn is shown by its superior weight when the Mangolds were pulled.

No. 5.—Mr. ALFRED C. SKINNER.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons.	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	26	13	64
B	10 loads Dung .. .. ..

No. 5.—Mr. ALFRED C. SKINNER'S EXPERIMENTS, West Somerset, Vale of Taunton.

Previous Cropping.

1885. Roots (dunged).
1886. Barley.
1887. Seeds (dunged),
1888. Wheat.
1889. Barley.

Cultivation for Mangold.

Dunged.—In March.
Sown, and First Artificials.—May 2 and 3.
Top-dressed.—July 14, August 9.
Soil.—Deep sandy Loam. New Red Sandstone.

Mr. Skinner reports on July 16th, that of the dunged Plots, E was best, and A second. Of the Plots without dung, that H is best; G, second; L, third; K the worst of the undunged Plots, though better than D. That Salt seemed to have crusted the land; and that, with the exception of Plot H, appeared so far disadvantageous.

On September 1st he reports: H, first; L, second; I, third; D, fourth; and remarks upon the yellowness of the leaves of all the salted Plots.

No. 6.—Mr. KNOLLYS.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons.	cwt.	lbs.
A	20 loads Dung (4*s*. 6*d*. per load)	4	10	0	30	18	44
B	10 loads Dung .. .. ..

No. 6.—Mr. KNOLLYS' EXPERIMENTS, West Somerset, near Milverton.

Previous Cropping.

1885. Swedes, fed off (5 cwt. Dissolved Bones).
1886. Barley, seeded.
1887. Clover and Rye Grass, mown.
1888. Second year's Clover, mown (Superphosphate).
1889. Wheat.

Cultivation for Mangold.

Dunged.—First week in May.
Sown, and First Artificials.—May 12.
Top-dressed.—June 27, August 6.
Soil.—Sandy Loam. New Red Sandstone.

Mr. Knollys' remarks upon the early ripening of H, I, and D, clearly the effect of the addition of Salt. The leaves of A also turned yellow very early.

Plot L started slowly, but maintained its growth and green tops to the time of pulling. K was very backward up to 1st September, but greatly improved in the warm autumn, though never reaching any of the other Plots.

No. 7.—Mr. JOHN KIDNER.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons.	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	24	3	24
B	10 loads Dung .. .. ..

No. 7.—Mr. JOHN KIDNER'S EXPERIMENTS, West Somerset, near Wellington.

Previous Cropping.

1885. Roots, drawn off (Dung and Nitrate of Soda).
1886. Wheat, seeded.
1887. Seeds.
1888. Wheat (Bath and West of England Experiments).
1889. Barley (no manure).

Cultivation for Mangold.

Dunged.—First week in May.
Sown, and First Artificials.—May 8.
Top-dressed.—July 4, August 9, September 2.
Soil.—Loam on Clay. Edge of Sandstone.

Mr. John Kidner states, that in Plots B and C he applied ¼ cwt. Nitrate of Soda with the Seed, instead of using the whole 2 cwt. as top-dressing.

On 10th July, B was best of the dunged Plots, and A the worst, while C, D, and E were about equal. Of the undunged Plots, H, I, and L took the lead.

On 1st September the artificial Plots generally, appeared better than the dunged; but all the Salt Plots showing yellow leaves.

No. 8.—Mr. SAMUEL KIDNER.

Plot.	Manures per Acre.	Cost of Manures per Acre. £	s.	d.	Produce per Acre. Tons	cwt.	lbs.
	Plots with Dung.						
A	20 loads Dung (4*s*. 6*d*. per load)	4	10	0	17	10	0
B	10 loads Dung .. .. ..

No. 8.—Mr. SAMUEL KIDNER'S EXPERIMENTS, West Somerset, near Milverton.

Previous Cropping.

1885. Wheat (6 cwt. Dissolved Bones; 1 cwt. Nitrate of Soda).
1886. Beans.
1887. Wheat (6 cwt. Dissolved Bones; 1 cwt. Nitrate of Soda).
1888. Dredge (5 cwt. Dissolved Bones; 1¼ cwt. Nitrate of Soda).
1889. Dredge (5 cwt. Dissolved Bones; 1¼ cwt. Nitrate of Soda).

Cultivation for Mangold.

Dunged.—Early in April.
Sown, and First Artificials.—April 30.
Top-dressed.—June 2, July 4, August 15.
Soil.—Heavy on Marl.

Mr. Samuel Kidner reports on July 11th, that of the dunged Plots, A was best; of the undunged Plots, G, H, and I were best, and about equal.

On September 1st he considered H to be the heaviest crop; then I, G, and E, about equal.

No. 9.—Mr. J. DREDGE.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	14 loads Dung (4s. 6d. per load)	3	3	0	18	18	0
B	14 loads Dung .. .. ..

No. 9.—Mr. J. DREDGE'S EXPERIMENTS, West Somerset, near Wellington.

Previous Cropping.

1885. Wheat.
1886. Clover, mown once.
1887. Clover, second year. Folded with sheep.
1888. Wheat.
1889. Winter Oats (1 cwt. Nitrate of Soda).

Cultivation for Mangold.

Dunged.—Last week in January.
Sown, and First Artificials.—May 2 and 3.
Top-dressed.—June 20, August 11.
Soil.—Red Marl, on Flint Stone and Clay.

Mr. Dredge had ploughed in Dung at the rate of about 14 loads per acre over the whole of the field he intended for Mangold, and consequently was unable to experiment on Plots without dung.

In July Mr. Dredge says that B, C, and D are perhaps the most growing, but that the plant was irregular throughout from destruction by wireworm, F having suffered the most.

No. 10.—Sir T. D. ACLAND.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	27	16	96
B	10 loads Dung .. .. ..

No. 10.—Sir T. D. ACLAND'S EXPERIMENTS, West Somerset, near Minehead.

Previous Cropping.

1885. Oats.
1886. Turnips.
1887. Mangold.
1888. Oats.
1889. Oats.

Cultivation for Mangold.

Dunged.—Early in April.
Sown, and First Artificials.—May 19.
Top-dressed.—July 8, August 4.
Soil.—Stone Rush, on Gravel.

On July 12, Mr. C. Birmingham reports that Plots A, B, and D were a little in advance of the other dunged Plots. That of the undunged Plots little difference could be observed between H, I, K, and L.

On September 1 he considered H, B, and D to be the best.

The weights of the Plots, however, show that H did not continue to improve as much as the others.

No. 11.—Mr. GEO. GIBBONS.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	21	7	0
B	10 loads Dung .. .. ..

No. 11.—Mr. GEO. GIBBONS' EXPERIMENTS, East Somerset, near Bath.

Previous Cropping.

1885. Roots.
1886. Oats.
1887. Beans.
1888. Wheat (1 cwt. Sulphate of Ammonia).
1889. Barley (1 cwt. Sulphate of Ammonia).

Cultivation for Mangold.

Dunged.—Second week in March.
Sown, and First Artificials.—May 12 to 15.
Top-dressed.—July 18, August 22.
Soil.—Lias on Clay.

Mr. Gibbons remarks that the wet and cold of the early part of the season was very unfavourable to the growth of Mangold, and that more weight was added in October than in any other month.

On inspection on September 27, D was the best of the dunged Plots, and B second; but H was the heaviest of all. K had a very regular plant and was full of growth. L not quite so regular, but very vigorous.

No. 12.—Capt. J. D. SHERSTON.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	44	15	80
B	10 loads Dung .. .. ..

No. 12.—Capt. J. D. SHERSTON'S EXPERIMENTS, East Somerset, Evercreech.

Previous Cropping.

1885. Oats.
1886. Roots (Artificials and Dung).
1887. Barley.
1888. Rye and Trifolium.
1889. Oats.

Cultivation for Mangold.

Dunged.—Early in April.
Sown, and First Artificials.—May 7 and 8.
Top-dressed.—June 18.
Soil.—Lias Clay on Lime Stone.

Mr. J. D. Allen kindly inspected these Mangolds twice. On the 26th July he reports E the best, B second, K third. On the 15th October he found that B and E had changed places, and that the dunged Plots throughout were superior to those without dung, an opinion which is confirmed by the actual weights.

No. 13.—Mr. T. D. TILL.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4s. 6d. per load)	4	10	0	25	18	64
B	10 loads Dung .. .. ..

No. 13.—Mr. T. D. TILL'S EXPERIMENTS, Gloucestershire, near Thornbury.

Previous Cropping.

1885. Roots (Dung and Artificials).
1886. Barley (seeded).
1887. Clover, mown (Dunged).
1888. Clover, grazed.
1889. Wheat.

Cultivation of Mangold.

Dunged.—Middle of April.
Sown, and First Artificials.—April 18.
Top-dressed.—May 17, June 20, July 19.
Soil.—Light and dry, Old Red Sandstone.

Mr. Till reports on 11th July that all the dunged Plots were inferior to those without dung. That L was the best Plot of all; H, I, K about equal; while D was the best of the dunged Plots.

On September 1st he considered that L was still the best, with I second, and H third.

On inspection on the 27th September Plot I was considered to be the best. The great excess of weight in this Plot is very remarkable, and Mr. Till can only account for it by the fact of this Plot having been less attacked by fly than any of the others.

No. 14.—Mr. EDEN JONES.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s*. 6*d*. per load)	4	10	0	26	14	32
B	20 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Mineral Superphosphate	6	1	6	33	18	64
C	20 loads Dung .. .. 2 cwt. Nitrate of Soda	5	8	6	33	17	16
D	20 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	5	13	6	39	7	16
E	20 loads Dung .. .. 4 cwt. Mineral Superphosphate	5	3	0	33	4	32
F	20 loads Dung	4	10	0	32	8	64
	Plots without Dung.						
G	4 cwt. Nitrate of Soda	1	17	0	..		
H	4 cwt. Mineral Superphosphate .. .. 4 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	2	15	0	..		
I	4 cwt. Mineral Superphosphate .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	1	16	6	..		
K	4 cwt. Mineral Superphosphate .. .. 3 cwt. Sulphate of Ammonia	2	10	6	..		
L	4 cwt. Mineral Superphosphate .. .. 4 cwt. Nitrate of Soda	2	10	0	..		
M	No Manure	..			..		

No. 14.—Mr. EDEN JONES' EXPERIMENTS, GLOUCESTERSHIRE, NEAR BRISTOL.

Previous Cropping.

1885. Wheat.
1886. Swedes.
1887. Wheat.
1888. Clover.
1889. Wheat.

Cultivation for Mangold.

Sown, and First Artificials.—April 19.
Top-dressed.—June 17.
Soil.—Light Loam on Red Marl.

Mr. Eden Jones had ploughed in Dung at the rate of 20 loads per acre over the whole of his Mangold land, and consequently was unable to have any Plots without Dung.

He reports in July that C, D, and F were about equal, D being slightly the best. In September that D was distinctly the best, B second, and that in A the plant was not so regular as in F, which no doubt accounts for the difference in weight of these two Plots.

No. 15.—Mr. W. V. BONNOR.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	30	4	32
B	10 loads Dung .. .. ..

No. 15.—Mr. W. V. BONNOR'S EXPERIMENTS, Herefordshire, near Ross.

Previous Cropping.

1885. Wheat (Dunged).
1886. Swedes, fed off (Bones and Mineral Superphosphate).
1887. Barley (seeded).
1888. Clover (Dunged in Autumn).
1889. Wheat.

Cultivation for Mangold.

Dunged.—In April.
Sown, and First Artificials.—May 3.
Top-dressed.—July 3, August 27.
Soil.—Free working, Old Red Sandstone.

These Plots were visited by our Inspector on September 26th, Plot I at that time appearing the heaviest, but with leaves turning yellow, as was also the case in H and D, and slightly so in A and E. The bulbs in L were not so forward, but the plant was very regular and full of growth.

No. 16.—Mr. JOHN BENNETT.

Plot.	Manures per Acre.	Cost of Manures per Acre. £	s.	d.	Produce per Acre. Tons	cwt.	lbs.
	Plots with Dung.						
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	25	0	52
B	10 loads Dung .. .. ..

No. 16.—Mr. JOHN BENNETT'S EXPERIMENTS, Herefordshire, near Ross.

Previous Cropping.

1885. Clover and Rye Grass.
1886. Barley (Dunged).
1887. Oats.
1888. Vetches, fed, then Turnips (15 loads Dung, 2 cwt. Dissolved Bones, 2 cwt. Kainit, 2 cwt. Mineral Superphosphate).
1889. Barley.

Cultivation for Mangold.

Dunged.—At the time of sowing.
Sown, and First Artificials.—May 1.
Top-dressed.—June 20, August 28.
Soil.—Light and dry on Dun Stone.

This land had been badly farmed prior to Mr. Bennett's tenancy, and shows its want of condition by the superiority of the dunged Plots. Mr. Bennett states that the plant was irregular owing to Charlock and annual weed, which, but for constant hoeing, would have smothered the crop.

No. 17.—Sir GABRIEL GOLDNEY.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4s. 6d. per load)	4	10	0	19	3	4
B	10 loads Dung .. .. ..

No. 17.—Sir GABRIEL GOLDNEY'S EXPERIMENTS, WILTSHIRE, NEAR WOOTTON BASSETT.

Previous Cropping.

1885. Wheat.
1886. Oats.
1887. Roots failed. Rape fed with Corn and Cake.
1888. Turnips, fed off. Rape, fed with Corn and Cake.
1889. Wheat.

Cultivation for Mangold.

Dunged.—March 6.
Sown, and First Artificials.—April 9.
Top-dressed.—June 16, August 4.
Soil.—Strong Loam on Limestone.

Mr. H. B. Napier in his Report says that the plant was irregular, and that the artificial Plots started best, and maintained the lead throughout.

No. 18.—Mr. STORY-MASKELYNE.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	21	0	0
B	10 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Mineral Superphosphate	3	16	6	30	7	16
C	10 loads Dung .. .. 2 cwt. Nitrate of Soda	3	3	6	21	1	48
D	10 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	3	8	6	23	0	0
E	20 loads Dung .. .. 4 cwt. Mineral Superphosphate	5	3	0	19	2	96
F	No Manure..		..		13	0	0
	Plots without Dung.						
G	4 cwt. Nitrate of Soda	1	17	0	23	3	64
H	4 cwt. Mineral Superphosphate .. .. .. 4 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	2	15	0	32	5	40
I	4 cwt. Mineral Superphosphate .. .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	1	16	6	24	3	64
K	4 cwt. Mineral Superphosphate .. .. .. 3 cwt. Sulphate of Ammonia	2	10	6	19	1	48
L	4 cwt. Mineral Superphosphate .. .. .. 4 cwt. Nitrate of Soda	2	10	0	20	4	72
M	No Manure		..		13	1	48

No. 18.—Mr. STORY-MASKELYNE'S EXPERIMENTS, WILTSHIRE, NEAR SWINDON.

Previous Cropping.

1885. Oats.
1886. Vetches, fed off with Corn and Cake.
1887. Wheat (seeded).
1888. Seeds, fed.
1889. Wheat.

Cultivation for Mangold.

Dunged.—December, 1889.
Sown, and First Artificials.—May 3.
Top-dressed.—June 17, July 15, August 7.
Soil.—Marl on Chalk Marl.

Mr. Allen Hart reported on September 1st that in the last few days the plants had become blighted, but those dressed with Salt less than others. He adds that Plots E, F, L and M suffered from the hoeing having been delayed by heavy rain.

No. 19.—Mr. RICHARDS.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	14	2	0
B	10 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Mineral Superphosphate	3	16	6	17	10	0
C	10 loads Dung .. .. 2 cwt. Nitrate of Soda	3	3	6	20	12	0
D	10 loads Dung .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	3	8	6	18	12	0
E	20 loads Dung .. .. 4 cwt. Mineral Superphosphate	5	3	0	16	0	0
F	No Manure	..			15	10	0
	Plots without Dung.						
G	4 cwt. Nitrate of Soda	1	17	0	23	2	0
H	4 cwt. Mineral Superphosphate .. .. 4 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	2	15	0	23	8	0
I	4 cwt. Mineral Superphosphate .. .. 2 cwt. Nitrate of Soda .. .. 4 cwt. Common Salt	1	16	6	20	10	0
K	4 cwt. Mineral Superphosphate .. .. 3 cwt. Sulphate of Ammonia	2	10	6	20	18	0
L	4 cwt. Mineral Superphosphate .. .. 4 cwt. Nitrate of Soda	2	10	0	22	12	0
M	No Manure	..			13	12	0

No. 19.—Mr. RICHARDS' EXPERIMENTS, Wiltshire, near Shaftesbury.

Previous Cropping.

1885. Beans.
1886. Turnips.
1887. Wheat.
1888. Vetches, fed off.
1889. Wheat.

Cultivation for Mangold.

Dunged.—1st week in April.
Sown, and First Artificials.—
Top-dressed.—
Soil.—Clay Loam on hard Chalk.

Mr. Richards in his Report on July 15th says, "the most striking feature is the marked superiority of the undunged Plots, especially H and I. These look very gross and well, in marked contrast to A, which is no better than F."

Our Inspector on his visit on the 8th October found the leaves of I turning yellow, but that Plots G and L were still growing.

No. 20.—Professor WRIGHTSON.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	21	2	32
B	10 loads Dung .. .. ..

No. 20.—Professor WRIGHTSON'S EXPERIMENTS, Wiltshire, Downton, near Salisbury.

Previous Cropping.

1884, '85, '86.—Swedes.
1887. Wheat.
1888. Winter Rye and Barley, followed by Mangold.
1889. Cabbage and Kale, fed off with Corn and Cake.

Cultivation for Mangold.

Dunged.—A few days before drilling.
Sown, and First Artificials.—April 19.
Top-dressed.—June 30.
Soil.—Good dry Loam on Gravel.

The cropping of this land, together with the consumption of a large quantity of Cake and Corn upon it by a ram-breeding flock, has brought it into very high condition; and hence Professor Wrightson considers that the action of the Mangold manures is less distinctly marked than on land in ordinary condition only. In this view the Professor draws attention to the comparatively small increase over the average (20 tons 12 cwts. 42 lbs.) of the two unmanured Plots, obtained by the heavier dressings of Dung and the double quantities of Nitrate of Soda, the Plots F and M having been, in fact, manured by the 1889 treatment.

No. 21.—Messrs. C. and T. COLES.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	30	0	0
B	10 loads Dung .. .. ..

No. 21.—Messrs. C. and T. COLES' EXPERIMENTS, Wiltshire, Edge of Salisbury Plain.

Previous Cropping.

1885. Wheat, after Swedes (Dung and Artificials), fed off with Cake.
1886. Barley.
1887. Mangold (20 loads Dung and Artificials).
1888. Wheat (10 loads Dung).
1889. Barley (½ cwt. Nitrate of Soda; 2 cwt. Salt).

Cultivation for Mangold.

Dunged.—Early in April.
Sown, and First Artificials.—May 7.
Top-dressed.—July 5, July 31.
Soil.—Gravelly Loam on Chalk.

Messrs. Coles' report on July 14th that of the dunged Plots, A, B and D appeared equally good; and of the undunged, H and I were the best, K being much behind.

The Report on September 1st was that D, H and I were a-head, but were getting a lighter green and ripening. At the time of pulling (November 7th) Plot K was still in full growth. Both L and E had a thin plant.

No. 22.—Mr. EAST.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	11	14	0
B	10 loads Dung .. .. ..

No. 22.—Mr. EAST'S EXPERIMENTS, HAMPSHIRE, NEAR STOCKBRIDGE.

Previous Cropping.

1885, '86, '87. Sainfoin, mown, afterwards fed with Sheep.
1888. Vetches, fed. Turnips, fed.
1889. Wheat.

Cultivation for Mangold.

Dunged.—May 6.
Sown, and First Artificials.—May 8.
Top-dressed.—July 25, Aug. 7.
Soil.—Light Chalk on Chalk.

Mr. Hewitt wrote that Mr. East's land coming for Mangold had the Dung ploughed in during the winter, and the only other piece available was on a poor thin soil not well suited for Mangold. The plant came up badly, and was checked by annual weeds. Mr. Hewitt considers the small produce chiefly attributable to the Dung being applied so late. He speaks of the great efficacy of the top-dressings of Nitrate of Soda. Before their application Plot H stood seventh and D sixth. On November 1st they had advanced to first and third. Plot E was more weedy than others, which probably accounts for its produce being less than A.

No. 23.—Mr. BRYANT MARSHALL.

Plot.	Manures per Acre.	Cost of Manures per Acre. £	s.	d.	Produce per Acre. Tons.	cwt.	lbs.
	Plots with Dung.						
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	15	16	0
B	10 loads Dung .. .. / 2 cwt. Nitrate of Soda .. .. / 4 cwt. Mineral Superphosphate	3	16	6	18	19	0
C	10 loads Dung .. .. / 2 cwt. Nitrate of Soda	3	3	6	18	13	0
D	10 loads Dung .. .. / 2 cwt. Nitrate of Soda .. .. / 4 cwt. Common Salt	3	8	6	21	7	0
E	20 loads Dung .. .. / 4 cwt. Mineral Superphosphate	5	3	0	18	13	0
F	No Manure	..			11	1	0
	Plots without Dung.						
G	4 cwt. Nitrate of Soda	1	17	0	16	13	0
H	4 cwt. Mineral Superphosphate .. .. / 4 cwt. Nitrate of Soda .. .. / 4 cwt. Common Salt	2	15	0	20	5	0
I	4 cwt. Mineral Superphosphate .. .. / 2 cwt. Nitrate of Soda .. .. / 4 cwt. Common Salt	1	16	6	16	0	0
K	4 cwt. Mineral Superphosphate .. .. / 3 cwt. Sulphate of Ammonia	2	10	6	15	13	0
L	4 cwt. Mineral Superphosphate .. .. / 4 cwt. Nitrate of Soda	2	10	0	21	18	0
M	No Manure	..			10	15	0

No. 23.—Mr. BRYANT MARSHALL'S EXPERIMENTS, Surrey, Godalming.

Previous Cropping.

1886. Roots.
1887. Barley, seeded.
1888. Clover.
1889. Wheat.

Cultivation for Mangold.

Dunged.—April 28, 29, 30.
Sown, and First Artificials.—May 1.
Top-dressed.—June 6, August 9.
Soil.—Light sandy Loam.

Mr. Bryant Marshall on July 14th reported the Dung Plots as, on the whole, superior to the undunged; B and D being the best, but closely followed by L and H. On 1st September this position was still maintained, and it will be seen by the ultimate weights that these four Plots proved the heaviest, though L and H had improved more than B.

No. 24.—Mr. HENRY BRASSEY.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons.	cwt.	lbs.
A	20 loads Dung (4*s.* 6*d.* per load)	4	10	0	16	6	0
B	10 loads Dung .. .. ..

No. 24.—Mr. HENRY BRASSEY'S EXPERIMENTS, KENT, NEAR AYLESFORD.

Previous Cropping.

1885. Oats (dunged for the Mangold).
1886. Mangold.
1887. Wheat, seeded.
1888. Clover Ley (dunged for Wheat).
1889. Wheat.

Cultivation for Mangold.

Dunged.—Last week in April.
Sown, and First Artificials.—May 5 and 6.
Top-dressed.—July 12, August 15.
Soil.—Dry Loam on Kentish Rag.

Mr. R. A. H. Seymour reports on July 29th, that D was the best of the twelve Plots; B, second; H, I, K and L having rather thinner plants, and not so good a colour.

On September 1st he puts H, first; K, second; I, third; with A, C, D about equal.

No. 25.—Mr. W. ASHCROFT.

Plot.	Manures per Acre.	Cost of Manures per Acre.			Produce per Acre.		
	Plots with Dung.						
		£	s.	d.	Tons.	cwt.	lbs.
A	20 loads Dung (4s. 6d. per load)	4	10	0	15	11	38
B	10 loads Dung .. .. ..

No. 25.—Mr. W. ASHCROFT'S EXPERIMENTS, Kent, near Beckenham.

Previous Cropping.

1885. Roots (Dung and Artificials).
1886. Barley, seeded.
1887. Seeds.
1888. Oats.
1889. Barley (3 cwt. Superphosphate; 1 cwt. Nitrate of Soda).

Cultivation for Mangold.

Dunged.—May 7 and 8.
Sown, and First Artificials.—May 7 and 8.
Top-dressed.—July 4, August 7, August 19.
Soil.—Clay on Chalk.

On July 15th Mr. Ashcroft writes that his Plots show decidedly the advantage of artificials, combined with Nitrate, to produce a good start, H and L being the best of all the Plots. H is greatly superior to I, where Nitrate of Soda was not sown with the seed. On the dunged Plots, the advantage of Superphosphate in the early stages of growth is apparent.

On September 1st, H and L still held the first places, and the artificial Plots generally were superior to the dunged. The weights, however, show that the dunged Plots improved in their later stages of growth.

XIX.—*Supplementary Note on Mangold Experiments*, 1890.

By Sir T. D. ACLAND, Bart., and Mr. STEVENS.

THOSE who take an interest in the Experiments so well arranged by Mr. Knollys may be glad to have an accurate statement in figures as to the haulage and men's time in storing a definite quantity of mangolds. The following particulars were furnished to me by Mr. Stevens, under whose superintendence the work was carried out, and it will be seen from them that there was no outlay greater than would be required for storing the same quantity of roots without any special Experiment.

T. D. A.

MANGOLD EXPERIMENTS, 1890.

The mangolds were pulled, carted to the farm-yard (about a quarter of a mile from the field), and weighed on October 25. Twenty-one men were employed,—viz., seven for pulling and loading, eleven for carting, and three for storing—and eleven horses and carts. The whole twelve quarter-acre plots were completed in eight hours. There were 135 loads, in all, weighed in that time, which is equal to one load passing over the weigh-bridge every three-and-half minutes. The weight of every load was taken by myself.

Everything went on in regular order throughout the day, and not the slighest mistake occurred.

Several practical farmers witnessed the work, and appeared to be much interested in it.

W. S.

The Note-Book.

1.—*The Potato Blight.*—"*Description.*"

In the 'Paternoster Review,' of October 1890, Dr. McWeeny writes as follows about this scourge which played such havoc during the past season :—

"In the minds of many, perhaps most people, there is a certain mystery attaching to the potato disease. The lightning swiftness of its spread, the misery it inflicts, and the very political exasperation for which it is (indirectly) responsible, are all calculated to attract men's minds to seek for the cause, and the cause is not at first apparent. I have heard farmers say that certain thunder-storms, attended with the appearance of peculiar-looking clouds, invariably produced the disease; others have told me that showers of rain, the drops of which on evaporating from a clean surface, left a peculiar brown stain behind, were to blame. This is effect—not cause.

"The fact is that the real cause is of such a character as to escape detection, unless sought for by the aid of resources, mental as well as optical, which are usually beyond the reach of those whose business brings them into immediate contact with the disease. The investigation has to be carried out in the laboratory, not in the field.

"Suppose we go into a field in August, and take a diseased potato-plant. If our specimen has been but recently attacked, the only unusual feature we can observe is that on the under side of some of the leaves there are circular brownish spots. Without special attention they would escape notice altogether. If our specimen is in a more advanced stage of the disease the leaves are crumpled, brown, and shrivelled; the stem is blackened in patches or completely, and lies prostrate on the ground. If we look attentively at one of the brown spots above-mentioned with a pocket-lens, a slight whitish bloom will be seen covering the leaf; owing to its smallness, however, nothing more can be detected. Let us take our specimen home and submit it to more careful investigation.

"How shall we proceed? The first essential is to procure a good crop of the *mould*, for mould it is, and to that end we lay by a couple of the spotted leaves on some moist sand under a bell-jar and wait a day or two. In the meanwhile we can occupy ourselves studying the appearances presented by the blackened leaves or stem of the more completely destroyed plant. Small portions are selected and cut by means of a razor, or, better, with an instrument termed a *microtome*, into such excessively thin slices that the light passes through them without difficulty. The slices, or *sections* as they are correctly termed, are 'mounted.'"

The author means that they are placed in glycerine jelly on a glass slide, covered with a piece of very thin glass, and can then be examined by the microscope.

"The cellular structure of the potato-plant is at once seen, and between the cells, if the section be very thin, threads may be observed, which pursue a wandering course through the intercellular spaces, sometimes running right through the cells, occasionally (though this is difficult to see) *tapping* one, so to speak, by sending little sucking tubes, *haustoria* they are called, through the cellulose wall into the cell, to appropriate and live upon the nutritive materials accumulated by the potato. When a potato-cell has had its juices sucked in this way, its transparent cellulose wall becomes a dirty yellow, its green chlorophyll grains become brown, its starch bodies disappear, devoured by the parasite, and finally the whole cell becomes an opaque disorganized mass. Now we know *why* and *how* the leaves and stems of diseased potato-plants become blackened and shrivelled up after the lapse of a couple of days.

"Returning to the brown-stained leaves which we have kept under the bell-jar, we find each spot covered with a very obvious mouldy vegetation, and on examining it, as an opaque object under a low power of the microscope, a truly wonderful sight meets our eyes. From the air-holes or *stomata* there emerges a forest of delicate threads of sparkling whiteness, each of which, as it rises, gives off one or more lateral branches, while towards the top there arise quite a number close together, giving to the tiny vegetable a beautiful tree-like appearance. This similarity to the higher plants is greatly enhanced by the fact that the branchlets are literally laden down with fruit, each one bearing numerous egg-shaped bodies, *conidia*, along its

sides, and invariably a terminal one at its apex. If we made a section of the leaf we could establish the fact that the threads or *hyphæ* we found ramifying between the cells are in direct continuity with those just described as growing out through the *stomata*—the aerial *hyphæ*. To the former is assigned the task of nutrition, to the latter that of reproduction. The food stuffs extracted by the intercellular *hyphæ* from the cells of the potato-plant are pumped up into the aerial *hyphæ* and utilised for the formation of the countless myriads of *conidia*, by means of which the fungus is propagated."

This propagation takes place as follows:—When the *conidia* are ripe they may become detached from the *hyphæ*, and floating in the air be conveyed to other potato-plants, upon which, should they become fixed, and favourable conditions exist, they undergo further changes. The chief necessary condition is the presence of moisture. The changes may be studied in the following manner.

"Let us dip a little tuft of the mould into a drop of water on a clean slide, apply a cover glass, and study the *conidia* under a high power. They are very regularly oval or lemon-shaped, with a small broken-off stalk at the base, and are about a thousandth of an inch in the long diameter. They have a tough outside coat, within which are to be seen granular contents. If we put them aside for a couple of hours, having taken the precaution to prevent the evaporation of the drop of water in which they are immersed, and then look at them again, we shall see a tendency on the part of the contents to arrange themselves in separate groups, each inside a little compartment of its own, and later on, if we are very, very patient indeed, we may be lucky enough to observe the bursting of the *conidia*, and the exit of the contents in the shape of excessively small masses of protoplasm, usually eight or ten in number, each of which is provided with two little whip-like appendages or *cilia*, by means of which it can lash or row itself along in the water and proceed in any direction with considerable velocity. These minute active bodies are called *zoospores*."

Let us here pause and study them a little further than our author. "These zoospores," says Prof. Worthington G. Smith,* "are able to sail about in the slightest film of moisture. After a brief time the little motile (actively moving) zoospores rest and take

* 'Diseases of Farm and Garden Crops.' Macmillan.

a globular form, the vibrating hairs dissolve away or drop into the finest dust. After a short rest the now quiescent zoospores burst and produce a thread of spawn." Or, in Dr. McWeeny's words:

> "It emits its germ tube and boldly pushes it through the thickened wall of the epidermal cell. The protoplasmic contents of the zoospore pass into the germ tube which, proceeding steadily, pierces the cell; it thus finds itself in an intercellular space where a new mycelium is formed, and thus a new potato-plant is infected and destroyed.
>
> "Such is the life-history of the fungus which produces the potato blight. There is nothing in the least mysterious about the matter. Its marvellous powers of reproduction account for the extreme rapidity with which it spreads. According to one calculation a square line of leaf surface covered with aerial *hyphæ* would probably bear about 20,000 *conidia*, each of which contains from eight to ten zoospores."

"It should be understood," writes Mr. Shirley Hibberd in the 'Times' of September 15, in an article which we shall refer to again in our next note, "that the disease does not pass down to the roots by way of the stems, or any inner conduit; its access is always directly from without, and consequently the outside of the leaf or the tuber is the vulnerable part."

2.—*The Potato Blight.*—"*Prevention.*"

BEFORE it is possible to attempt to check or overcome any disease in plant or animal it is essential that we first understand the cause and nature of the disease. The preceding "Note" has given a clear description of the cause and nature of the Potato Blight. In this will be gathered together from many sources some of the best advice which has been given as to "prevention" and "cure." It will have been seen that the chief cause is a wet season at that period of the growth of the potato-fungus when the ripe spores are disseminated in the atmosphere, and find a resting-place and conditions suitable for their growth on the leaves of unattacked plants. In the words of the Editor of 'The Farmer,' on 25th August, "the blight is the outcome of the abnormal rainfall of the past few weeks," hence "dry, bright weather is probably the surest preventive that can be had." But this we cannot control, and it may be said, What can be done?

First, one may ask, Where do the germs of the disease

originally come from? The following quotation from Professor W. G. Smith will fully answer this question:—

> "The potato and its immediate allies are not the only plants destroyed by the potato-fungus. Of late years in some districts the out-of-door cultivation of the tomato has been quite stopped by the ravages made upon it by the potato-fungus. Sometimes the pest may be seen growing upon the henbane—or the common bitter-sweet of our hedges. Sometimes the parasite may be seen upon an entirely different natural order of plants from that of the potato."

Here then it is evident that the disease is probably always more or less present in the neighbourhood of our potato-fields, and one great lesson which it teaches is the necessity of cleanliness where potatoes are grown. The following quotation from a letter by Mr. J. C. Cooke to 'The Farmers' Gazette,' of 11th October, 1890, shows the importance of cleanliness:—

> "I find from observation that potatoes planted in drills this season under certain conditions are more free from disease than those planted in ridges or lazybeds, as they are called. I planted a number of drills in a piece of land where turnips had been the year previous, on or about the 1st of April last. In June I took the clay from them with a plough, from which the mould-board had been removed. A few days afterwards they were properly weeded, and as the weather was dry at the time of weeding, I left them to stand so for a week until all the weeds were thoroughly dead. A drill harrow was then passed through each furrow or alley, and afterwards earthed up. In the very same field I gave two drills of potatoes to a labourer: they were manured with the same stuff (farmyard dung), seeded with the same potatoes, and got the same after-cultivation, and were planted at the same time, and yet more than half of his are rotten, while mine are entirely and perfectly sound, dry, and most palatable. I can only attribute one cause for this, viz. whereas I weeded and cleaned my sowing, he did not, but allowed a mass of all sorts of familiar annuals to crop up, and this cause, and this cause only, must be the reason of his crop being a failure. This observation confirms me in the belief that weeding is essentially and unmistakably necessary to ensure a sound average crop of potatoes."

It is certain that one main cause of disease in plants is due to a want of vigorous growth. A strong, healthy plant, well

nourished, and with even moderately favourable conditions of growth, has a greater power to resist the attack of a fungus than the fungus has to attack it. This is illustrated every year by one or other of our farm crops. Excessive manuring with farmyard or nitrogenous manures invariably appears to produce plants liable to the attacks of various fungi. Professor Kinch, in an article on 'Manures' contributed to 'The Farmer,' speaking of potatoes, says: "Some farmyard-manure is highly desirable as rendering a crop much more certain and more independent of season; but, in addition, a rather heavy dressing of artificials will often pay. Potash is a desirable addition in most soils. From 5 to 6 cwt. of superphosphate, 1 cwt. of sulphate of potassium, and 1½ to 2 cwt. of sulphate of ammonia may be used." More recently Dr. Griffiths claims (see his 'Diseases of Crops' in 'The Library') that iron sulphate may be used with advantage, not only as a manure, but also as an actual destroyer of the potato-fungus, by dissolving 2 lbs. of commercial iron sulphate in 10 gallons of water, and distributing "it by means of a Strawsonizer at the rate of two gallons an acre."

The importance of proper manuring cannot be over-estimated, and the following quotations from a letter by H. W. Ward in the 'Times' of September 22 may be read with advantage:—

> "Experience tells me that potatoes growing in ground fertilised with artificial manure—say, Peruvian guano—are invariably not only less liable to be attacked by disease of any kind, but they are also cleaner in the skin, and a better quality than are tubers resulting from plantings made in ground which had been liberally dressed with farmyard-manure a few weeks before the sets were planted. This is a fact that cannot be too widely known. The planting of potatoes in ground into which is ploughed, not unfrequently at the time of planting, a heavy coating of farmyard-manure, rich in gaseous matter, is a great mistake, inasmuch as it promotes an over-luxuriant growth of haulm, at the expense of the weight and quality of the roots produced. Moreover, potatoes produced in soil surcharged with ammonia are generally deficient in quality, the skin being somewhat coarse and scabby. Indeed, both haulm and tubers produced under these undesirable conditions become an easy prey to disease, in the event of an undue quantity of rain falling towards the end of July.
>
> "Of course, all naturally poor and exhausted soils should be enriched more or less according to the nature and special requirements of the individual root or cereal with which each field or portion of a field is to be cropped. There is, however, as I have already endeavoured to show,

a right and a wrong time to enrich the soil when the fertiliser employed is in the form of rank farmyard-manure. I should plough a good dressing of the latter into ground intended to be cropped with cereals, and the following March plant it with potatoes without any additional manurial dressing of any kind being given."

That certain varieties of potatoes appear to resist the potato disease better than other varieties is universally recognised; to quote Mr. Shirley Hibberd, "some even escaping unharmed, when others on the same ground succumb quickly." "The power of resistance appears to reside in the cuticle, which, by extra firmness of texture, offers an impediment to the penetration of the agent of destruction;" though some say that "generally speaking the disease-resisting varieties are not of first-class quality." Of these varieties Mr. Ward, in the letter above referred to, quotes four. "These varieties are Carter's Holborn Perfection and Carter's Reliance. The former, in my opinion, is the better of the two. It is a long cylindrical kidney, with a white skin and slightly uneven surface. The latter is a flattish kidney, with very smooth, white skin, and few, scarcely perceptible, eyes. Both varieties are of good quality and very floury when cooked. Other excellent potatoes of disease-resisting qualities are Sutton's 'Reading Russet' and 'Early Border.'"

Upon the same subject Mr. Hibberd writes:—

"While many varieties once renowned for productiveness and high quality have passed out of cultivation, owing to their small powers of resistance, others remain and have been added to, so that we now possess an extensive collection, the merits of which are well known. 'Magnum Bonum,' 'Reading Russet,' and 'Satisfaction' are representatives."

With regard to the method of cultivation, Mr. Ward makes the following suggestions as the result of lengthy experience.

"All potatoes should, where the work can be done, be planted by the end of March, or at the latest by the end of the first week in April. When planted later they have not sufficient time to complete their growth before a general fall in the temperature takes place in early autumn. This should be avoided."

One point to which he particularly draws attention, is that

"Many people make a grave mistake in planting their potatoes too closely together. Instead of allowing a space

of two feet between the drills or rows, and nine inches from seed to seed in the rows for early varieties, and from two to three feet between the rows, and from nine to twelve inches in the rows for mid-season and general crop, stronger-growing varieties, they allow little more than half the distances indicated for the crop, under the erroneous impression that they thereby secure a greater weight of produce off a given area—in fact, their doing so thwarts the very object aimed at, and renders the crop liable to be attacked by disease without any other cause for its presence than the crowding of the plants—that is, insufficiency of room for the individual plants to develop themselves and the absence of a free circulation of fresh air among the haulms. The crowding of all garden and field crops is an error much too frequently met with, and the practice cannot well be too strongly condemned."

Mr. Hibberd's advice is to

"Select for seed purposes tubers of moderate size and of good typical form, or, say, handsome tubers properly representing one variety, and being neither very large nor very small.

"The moulding up that is commonly practised has been the subject of many careful experiments, and the absolute necessity for moulding has been abundantly demonstrated. Potatoes not well moulded are readily assailed by disease, and rot on the ground; on the other hand, scientific moulding is a powerful protector, as the early covering not only favours expansion of the tubers and the accumulation of starch, but places them at a sufficient distance from the germs that are scattered by millions in the atmosphere, and that eat into leaf or root alike whenever contact is possible.

"One very simple method of moulding, carried out in the gardens of Chiswick three years in succession, proved of such value that it insured a crop in the very midst of a plague-smitten plantation that was neglected intentionally to serve for comparison. This system consists in high moulding to a sharp ridge, and then bending the green shaws all to one side. Ordinary moulding should be the subject of several operations, both for stirring the earth between the rows and to cover the roots gradually as they fill the ridge, for to cover them to a considerable depth at one effort is to give the plant a check and limit its production.

"By moulding high when the plant has attained to its

later stages and begins to be in danger, the spores are shed at a distance from the roots of the plant, and there is less likelihood of their being washed down into the hill to make contact with the tubers."

Somewhat similar to the above advice, and not less practical, is that issued by the Commissioners of National Education in Ireland addressed to National School teachers, and intended "to be read aloud occasionally by the teacher to the pupils," the conclusion of which advice is as follows:—

> "Change of seed is most important. Select seed potatoes from a soil different from that in which they are to be planted, and, if possible, from a distance. Potatoes grown on peat or moor should be chosen for the ordinary arable soils. It is most advisable not to depend altogether upon one variety. Practise early planting in order that a good growth may be made before the period when the disease appears. Plant potatoes in land naturally dry as early as February, and where circumstances permit even in January. Low lands and bog should be laid in ridges during winter, for the purpose of draining and for securing as early as possible a dried seed-bed in spring. Plant all potatoes before they sprout—vigour is lost through planting potatoes whose buds have been taken off."

Such is the best advice we have been able to cull from the many articles written upon the subject of potato disease last year. So far, it refers to what ought to be done to resist the potato disease—a few words as to what should be done when the disease has manifested itself.

It will have been seen from the preceding "Note" that the disease mainly attacks the leaves. Here then we have an explanation of a remedy which, so far as can be gathered, has been found efficacious, namely to cut off or remove the haulms of all attacked plants so soon as the disease makes its appearance. This plan, though not new, obtains fresh significance when we understand the reason for it. That it has been adopted, and with advantage, is shown by the following paragraph from an article previously quoted:—

> "Mr. John Danily, late Chief Constable of Montgomeryshire, advises farmers to try a plan of prevention which he himself has found efficacious. Here it is for what it is worth:—'Some few years ago black blotches attacked a bed of Lapstone kidneys, and I ordered my man to draw up the haulms. As he demurred, saying it was of no use, I allowed the haulms to remain on two

rows, but had them removed from the others. They were left thus for two or three weeks and then dug up, when it was found that not a potato from which the haulms had been removed was diseased, and also that there was not a sound potato in the two rows in which they had been allowed to remain.' "

Mr. Hibberd also advises that—

"It is of great importance in all seasons, and of the greatest importance in the present, that so soon as a fair bulk of tubers is formed they may be lifted with safety, and without regard to their degree of ripeness. It is the practice with many to leave the crop in the ground to ripen, or if diseased, to 'clean itself.'

"The result of many experiments and observations is that potatoes may be lifted with advantage, however unripe, provided they are fully grown, for when transferred to the store, whether it be a well-made clamp or a dry-root house, the ripening will be safely completed, and they will keep better and improve faster than if left in the ground, however favourable the circumstances may be."

To prevent as far as possible the occurrence of the disease in the following year it is essential to utterly destroy every particle of diseased material. The necessity for this is well described by a writer in the 'Agricultural Gazette' of September 22, under the initials H. S. D. :—

"Burn all infested haulms or tops; this is a point that I would especially impress upon those engaged in the growth of potatoes. According to the late Rev. M. G. Berkeley, F.R.S., the fungus sometimes hibernates and becomes perennial, reproducing the disease if the external surroundings are favourable to its growth, in succeeding years. Some farmers plough the tops under, which is a fertile source of danger; others cart them to the manure heap, which is still better; others again put them in heaps, in the corners of the fields or waste places, which practice is to be condemned, as such heaps are nothing more nor less than happy breeding-grounds and nurseries; and lastly, some few completely destroy them by burning, which is the only safe and certain cure, and one that ought to be universally adopted."

In conclusion, we cannot do better than quote a few words from Mr. Hibberd's letter: "Prosperity is not secured by accidents and exceptions: bad practices will end in bad results."

3.—*On Recent Bacteriological Study in relation to Dairying.* By Dr. ADAMATZ, Vienna. [*Translation.*]

IT was long thought, and it is now convincingly proved, that bacteria are the cause of many of the diseased conditions of milk, that disturbances in the ripening processes of cheese are due to their action, and, on the other hand, that in order to procure definite varieties of cheese their presence is indispensable. Yet even at the present day many doubt the accuracy of this teaching.

The dairy industry might in many respects have well followed the example of other industries depending upon fermentation, in which this knowledge has been utilised much sooner.

The importance of bacteriology (the study of bacteria) to the dairy industry is easily recognised when we consider that milk, and most of its products, form the best conceivable food for the majority of the lower living organisms, so that milk, which normally comes from the udder free from any germs, becomes during the milking process strongly infected with different varieties of bacteria, and after a few hours contains thousands of millions of micro-organisms, which exercise their respective functions.

We have to consider their activity—

1. In the fresh milk.
2. In the production of various preparations of milk.
3. In the ripening of cream and in the butter obtained therefrom.
4. In the normal ripening processes of cheese.
5. In the abnormal ripening processes of cheese.

In fresh milk characteristic changes take place brought about by the different kinds of mould and bacteria. Such is the spontaneous coagulation of milk due to the lactic acid ferment, which may be pure, or take place side by side with other phenomena. A spontaneous coagulation of milk takes place through the secretion of the rennet bacteria, while the bacteria belonging to this group are also of importance in the manufacture of cheese. The so-called milk-taints also depend upon the activity of bacteria. At one time they produce colouring matters, and cause blue or red milk, &c. At another time they cause the milk to become bitter, or induce fermentation. Milk which one can draw out into long threads, hence called "ropy" milk, is also the result of special bacteria. Moreover, besides those which are essentially "milk-bacteria," if one may so designate them, others find in milk a favourable feeding ground and rapidly propagate. Hence many pathogenic

(disease-producing) bacteria when transplanted from milk to the human being, become the cause of infectious disease.

Further, there are definite bacteria which are absolutely essential for the production of certain milk preparations, such as "kefir," * and the Swedish "thick-milk."

That the ripening † of cream is influenced to a large extent by bacteria present in the cream is well known, while, from the results of the investigations of von Storch and Weigmann, it appears there are definite bacteria which confer upon butter its aroma, and with pure cultivations of which cream may be inoculated.‡

The great number of normal as well as of abnormal changes which take place during the ripening of different varieties of cheese, is also dependent upon the number and kind of bacteria present, and it is the business of the cheese-maker while restraining the undesirable activity of the same to propagate and to increase the activity of those kinds which are indispensable to the production of the different varieties of cheese.

4.—*In-and-In Breeding.* By John Downing.

It has been my good fortune to enjoy the acquaintance of most and the friendship of many of the leading breeders of Shorthorns in modern days, and it was my privilege to have thus afforded to me opportunities of inspection, under favourable circumstances, of the best herds, as well as of free discussion on the subject of breeding with the owners of many of those herds.

The result was that by the year 1870 I had fully come to the conclusion that the system of long-continued close breeding, which was then in strong fashion, was wrong, and that its progress should, in the interest of the Shorthorn breed, be arrested; that otherwise many of the best tribes would soon be ruined or entirely lost, and that this would involve serious detriment to the breed.

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* "Kefir" is described by De Bary as being "a fluid effervescing kind of sour milk containing a certain amount of alcohol, which the inhabitants of the upper Caucasus prepare from the milk of cows, goats, or sheep."

† [The author has "souring," but doubtless he refers to the whole process of ripening.]

‡ [The author here refers to some very important experiments in which bacteria have been isolated and cultivated in a chemically-prepared food until only one variety is obtained therein. This variety is subsequently introduced into milk free from any other bacteria, by which means the influence of the cultivated bacteria and the changes they produce are studied. This new field of investigation, and the possibility which it opens out of inoculating milk with pure and desired varieties of bacteria, may have considerable practical application in the future.—Assoc. Ed.]

It is most difficult to realise now the heated feelings upon these questions which were at that time prevalent, the wild lengths to which the supporters of the fashion went in their efforts to maintain their particular views, and the bitter rivalry which was constantly, and sometimes rather painfully, made conspicuous between the allies of the Bates and of the Booth strains.

A catalogue issued by a leading admirer of the Bates' blood, who is now dead, had upon its opening page, "Good wine needs no bush: Bates and no surrender."

In 1867 the late Mr. William Carr published 'The History of the Killerby, Studley, and Warlaby Shorthorns,' one of the most fascinating books of the kind which was ever penned.

Towards the close of his book Mr. Carr alludes to the in-and-in-breeding pursued at Warlaby, praises that system, and quotes the opinion of Mr. Richard Booth, which was given in answer to a suggestion that the herd might require an infusion of fresh blood.

Mr. Booth said:—"It is clear that the only consideration which would justify me in having recourse to a cross would be the discovery of a tribe, which besides possessing in an equal degree with my own the good qualities we have mentioned, are superior to them in utility and symmetry. Where is it? The result of the last three crosses upon which I ventured—'Water King,' 'Exquisite,' and 'Lord Stanley'—has made me distrust the policy of any further step in that direction; nor have the results I have witnessed of the experiments of others in crossing animals of my blood with the most fashionable bulls of other strains tended in any instance to remove that distrust."

This expression of opinion on the part of so eminent a breeder as the late Mr. Richard Booth—the head of the Booth party—had, of course, a far-reaching effect, and guided the action of most of the admirers of the Booth strain.

I must, however, say, in justice to the claims of Mr. R. Booth as a breeder of eminence, that I was informed by the late Mr. Unthank, of Netherscales, that Mr. Booth did not at all deny the probable utility of a new cross, but felt that at his advanced time of life it would not be judicious for him to take a new departure.

There were, however, breeders of repute, and even of eminence, among the Bates and Booth parties who did not share the opinions of the advocates of, so to speak, exclusive breeding.

The late Mr. Thomas Barnes, of Westland, co. Meath, was one of the few in a leading place who, in the high days of fashion and pure pedigree, left the beaten track and outraged the feelings of the "purists" by sending his best pure Booth cow 'Sylph,' for service by Mr. Bolden's 'Grand Duke III.' This

event caused a storm among the supporters of the Booth blood, for it was an admission by a man of undoubted ability and great experience that, in his opinion, good was to be obtained from an infusion of blood from the rival strain—that favoured by the great party in opposition.

Mr. Barnes died in 1871, many years after the bold step in crossing had been taken. His herd was announced to be sold, and there was much excitement as to how the pure Booth 'Mantalinis' and those which were crossed with Bates blood would respectively sell. The "pure" yearling heifer 'Mantalini' fetched 750 guineas, while the highest price for a crossed animal of the same tribe was 335 guineas.

The "purists" went away rejoicing; the sale test had, they thought, scattered to the winds the pretensions of those who believed in the desirability of crossing the pure strains.

In 1872 I ventured to publish a preface to the private catalogue of my herd, in which I took the liberty to defend Mr. Barnes' course, and I endeavoured to show that the fashion of "pure" breeding was unsound and bad, and contrary to the practice of the most eminent breeders in the past.

My preface was by many coldly received, as I had expected, and by some in rather a hostile spirit, though it was meant to do them good.

In the press I received no support save from the Shorthorn Intelligence in *Bell's Messenger*.

While Mr. W. Carr was engaged in writing his 'History of the Booth Herds' and in marshalling opinion in favour of close breeding, Mr. Charles Darwin was engaged in writing 'Animals and Plants under Domestication,' a work which was published in the same year (1867) that Mr. Carr's book saw the light.

In this remarkable production, Mr. Darwin says at once that the prevention of free crossing and the intentional matching of individual animals are the corner-stones of the breeders' art; but he adds that, with the evidence before him, he is convinced that it is a great law of nature that all organic beings profit from an occasional cross with individuals not closely related to them in blood; and that, on the other hand, long-continued interbreeding is injurious. He was aware that throughout the whole organic world elaborate provision had been made for the occasional union of distinct individuals.

Mr. Darwin knew that close interbreeding may with some animals be carried on for a considerable period with impunity by the selection of the most vigorous and healthy individuals, but sooner or later evil followed; the visibility of the ill-effects was not in such cases readily recognised, because the deterioration was gradual.

It will thus be seen that there were at the same time put before the world the conflicting opinions, upon the subject of breeding, of Mr. Richard Booth, the owner of a great herd, and of Mr. Darwin, one of the greatest of naturalists. Fully agreeing with Mr. Darwin's views, which coincided with the knowledge acquired in my experience, I wrote to him in the autumn of 1873, enclosed a copy of the little treatise I had written in the preceding year, expressed my adhesion to his views and my desire to visit him, so that I might have from himself his opinions upon various points, and that I might put before him what I knew of the injurious results of long-continued close-breeding in Shorthorns.

In his reply, Mr. Darwin said: "I have been much gratified by your letter; it is in the highest degree satisfactory to me to find that a man with such large experience as yourself agrees with what I have deduced to a considerable extent." He invited me to visit him at his home in Kent, and in October, 1873, I found myself in the home of the great naturalist, quietly discussing the then burning question of close-breeding in Shorthorns.

Mr. Darwin had the art of making a stranger speedily at ease, and he at once proceeded to discuss with me the matter of consanguineous relationships. He mentioned that his deductions as to the evil results of close breeding had been combated by some who said that he was a mere theorist, but that they, practical men who had long experience in breeding cattle, differed from him. He was particularly pleased when I explained that there was at the time a certain fashion prevalent, and that this fashion insisted upon what was termed "pure" blood.

I also told him that I had known barrenness and abortion to have been frequent in some closely-bred herds, that cases of blindness came to my knowledge, and that I had seen calves got by a bull—much in-bred—from cows related to him, which were affected with brain disease so badly that they were slaughtered while very young. The calves from cows by the same sire, but not related to him, were not so affected. He had heard of pigs born idiotic and without sense even to suck, and when attempting to move they could not walk straight. I gave instances of consumptive tubercular disease, which came under my observation. The animals were very closely bred, and for some years looked healthy, but when the disease had attained a certain height, they rapidly broke up and died. I saw their lungs, which were very much perforated with tubercles.

In 'Animals and Plants' Mr. Darwin had stated that animals may seem robust, but yet may be unfertile from in-and-in-

breeding, and he was anxious to know if I had seen such cases, to which question I was able to reply in the affirmative.

But perhaps there was nothing upon which he spoke with such lively interest as proving the value of the infusion of a fresh element, as the result of a trial with plants which he had not very long since made. One plant was fertilised by pollen from the same flower, the other by pollen from a distinct plant of the same variety. He did not expect that the results would exhibit any remarkable difference, but, to his astonishment, the young seedlings from the latter or crossed seed were twice as tall as the seedlings from the self-fertilised seed, both seeds having germinated on the same day.

This striking result surprised him. Indeed, it seemed to him incredible that such a result could be due to a single act of self-fertilisation, and it was only in the following year, when precisely the same result occurred in the case of a similar experiment, that his attention became fixed upon it, and that he regarded it as of great importance. Until then he had always supposed that no evil effects would be visible until after several generations of self-fertilisation, but now he saw that one generation sometimes sufficed to make a great difference, and the existence of dimorphic plants and all the wonderful contrivances of orchids were quite intelligible to him. He afterwards published his book on 'The Effects of Self and Cross Fertilisation,' the result of eleven years of experimental work.

Believers in Mr. Darwin's views were soon to be gratified by the exhibition of altered practice among the owners of fashionable herds.

In 1875 the prudent purchase at the Aylesby sale of a dozen females to recruit the great herd at Warlaby was the sensation of the time. The Wetherby 'Duchesses' were also receiving infusions of fresh blood, and there was an eager demand from owners of Bates herds for Mr. Oliver's 'Grand Duke' bulls, which inherited Booth blood through the crosses taken by the late Mr. S. E. Bolden.

A great change has now taken place; paper pedigree no longer suffices to sell a Shorthorn, there must be merit, and that of no mean order, to secure buyers. It is, therefore, safe to say that at the present time the breeding of Shorthorns is generally conducted on sound and good lines; the man who has the skill to breed the best animals must come to the front, and the best animals are sure to come of good blood.—*Live Stock Journal.*

5.—*Weather Forecasts.*

FOR some years past weather forecasts have formed a notable feature of our daily newspapers, and in the 'Times' and some of the other papers we have placed before us, in addition to the forecasts, a small map or chart of the British Islands and the countries contiguous thereto, marked with certain curved dotted lines, with arrows pointing in different directions, and with other hieroglyphics to which certain meanings are attached. The curved lines are "isobars," or lines of equal barometrical pressure, and the figure at the termination of each gives its value. The arrows show the direction of the wind in the particular locality where they fly, and the number of barbs upon the messenger denotes the strength of the breeze. In addition to this information we are also given the temperature at various stations all over the area covered by the chart, and a knowledge of the state of the sea, that is, whether it be rough, smooth, or in a state of calm. It is from a study of this chart, coupled with a knowledge of the actual state of the weather at various stations on a given day, that the Meteorological Office is enabled to indicate the kind of weather which may be reasonably looked for during the next twenty-four hours.

The isobars of the chart represent the most important feature of it so far as weather forecasting is concerned, for all such predictions are founded upon barometrical readings. This will at first seem difficult to believe, for we have all had experience of household barometers, and know full well that often when it points to "set fair," the weather outside is rainy, and *vice versâ*. Hope never yet told such flattering tales as these barometers do with regard to fair weather when all is foul. But we must not be too hasty in blaming a valuable instrument, when we should rather blame the maker for attaching to it words which are altogether useless and misleading. In one sense the barometer may be said to have come before its time, for its value could never be fully appreciated before it was possible, as it is now, to compare its readings at a given moment over a large area. This is done daily by means of the electric telegraph, and on the faith of the messages so received by the Meteorological Office, the charts and forecasts are prepared.

In order to give a general outline of the manner in which this is accomplished, it will be necessary to point out that the curved lines, or isobars, represent parts of two great barometrical systems, and that one is known as a "cyclone," and the other as an "anti-cyclone." The first may be regarded as

indicative of bad weather, for it is usually accompanied by rain or snow, according to season, and by leaden skies and gusty wind. Its centre is marked by an area of low barometric pressure, and the rotatory movement of the winds round about it are in a direction contrary to the hands of a watch. The anti-cyclone is the reverse of all these things. Light breezes circulate round a high pressure centre, and we have those bright, balmy days so valued by people in general. It is the relation which exists between these two systems, which travel slowly or quickly over the face of our part of the globe, which enables the weather forecasts to be tabulated. It is true that they are very often wrong, but experience shows that, in the aggregate, they are correct to the extent of about 66 per cent.; or, to put it in other words, two forecasts out of three are borne out by the weather which afterwards comes to us.

There are many difficulties in the way of making reliable forecasts, and the chief one is due to our insular position. Most of the cyclones which bring us such bad weather travel across our country from west to east, and therefore find their origin in the Atlantic Ocean. How they are formed no one can say; all we know is that they are due, like all other atmospheric phenomena, to solar radiation. If it were possible to dot signal stations at distances of a few hundred miles all over the great western ocean, and to place them all in electrical communication with London, the forecasts would become far more reliable than they are now, and the idea of establishing at least one such station in mid-ocean has more than once been ventilated. The difficulties in the way of such an enterprise may, however, be looked upon as insuperable.—*The Photographic News.*

Those who have lately consulted day by day the weather forecasts cannot fail to have been struck by their remarkable accuracy. How much meteorology has advanced, and how valuable is the assistance which it lends in the practical business of life, the last Report of the Meteorological Council of the Royal Society well shows. Comparing the weather forecasts of 1881 with those of 1889–90, it appears that the percentage of complete successes had risen from 34 to 49, and that the percentage of successes of all kinds, complete and partial, had increased from 76 to 81. We cannot say that the progress is uniform. The percentage of successes in 1885 and 1887 was higher than it has been since; probably there were special circumstances to account for this. But in the course of nine years a distinct advance is discernible. It has of late been customary for the department to issue forecasts as to the weather probable in the hay harvest. As to some districts—for example,

the Midland Counties—the percentage of correct anticipations was no less than 95. The forecasts for 1889 were 5 per cent. better than those for 1888, and were the most successful ever published. In the system of storm warnings for the coast the results are, on the whole, satisfactory. The department can point with pride to the fact that in 1889, 81·2 per cent. of its warnings were fully justified. In 1884 the percentage of predictions completely verified by subsequent gales was as high as 66·4, while in 1889 it was only 47·7. It is to be borne in mind that, notwithstanding the increase of observations, there are large tracts of ocean, of the phenomena originating in which the meteorologist knows absolutely nothing until long after they have expended their energy. The Report says, "it is doubtful how far greater success is likely to be attained, so long as, as at present, no information can be obtained concerning atmospheric changes going on over the Atlantic beyond the west coast of Ireland." Out of that unknown region may come at any moment a gale which will upset the most careful calculations founded on observations telegraphed from land stations.

For the time there appears to be a pause in the progress of the art of scientific prediction. Until we know within a few hours what is going on in mid-Atlantic and regions nearer our shores, it seems improbable that much greater accuracy will be obtained.

All over the country is a small army of volunteer observers. But recruits are in request. In many districts from which information would be most desirable there are very few observers, and the result is of course prejudicial. No other science depends so much upon varied co-operation. Every new observer, if only accurate and honest, may, from the first day he sets to work, feel that he is distinctly contributing to the advance of science. The marvel perhaps is that more country gentlemen with time on their hands do not find in the chronicling of accurate observations for the benefit of meteorological science a happy combination of business and pleasure. No large amount of instruments is needed, and the few required are not complicated. With a thermometer, an anemograph, a rain gauge, and a sunshine recorder, the best of work may be done.

The whole subject of meteorological phenomena is infinitely more complicated than was once supposed. Yet, if much remains to be done, much has been done. No small advance has been made when one out of every two forecasts is perfectly correct, and four out of every five are partly so. The agriculturist has good reason to be grateful to those who can tell him nine times out of ten the weather in store for him in harvest. This advance has been made chiefly in about a quarter of a

century. What will be the condition of things a quarter of a century hence if there be like progress? To be able to take by sea and land precautions sufficient to avert great calamities, seems not only possible, but within measurable distance of attainment.—*The Times.*

6.—*Turkeys.* By K. C. M.

WHAT a happy look steals across the face of many when mention is made of turkeys, for it brings to mind the happiest season of the whole year—Christmas—as the turkey is essentially a Christmas bird! Hundreds of people have merely to order in the biggest turkey they can get, with no trouble as to the cost. It is to such customers that the turkey breeder looks to repay him for his year's outlay—of money, time, and anxiety. Everyone who knows anything about turkeys agrees that it is the very finest birds which pay the best. Rich people always like to have as good if not a better turkey than any of their friends, and they do not mind what they pay for it. So perhaps a few words on the subject of turkeys may be acceptable to some of my readers.

Those who think of breeding a lot of birds for next Christmas must first get them into condition for breeding purposes. I will, in the first place, say a few words as regards fattening the young ones, and then refer to the stock birds. We all know that good fattening will not make small-boned birds big ones, but a small, well-fattened turkey will generally find a purchaser, whereas a thin one would be passed over and left on the salesman's hands. If possible, one should have big-bodied birds, and then go the right way about fattening them. Those who only have small ones must do their best with them, and make an endeavour to breed better and more profitable ones each year. Some people put their turkeys in coops to fatten. This is a great mistake. They should be put in sheds which are somewhat darkened. If there is a window, a curtain should be placed over it and only drawn on one side when the birds are fed and watered, and then replaced. They fatten much better in this way than when left in daylight all the time. Give the birds plenty of ventilation, and yet at the same time keep them fairly warm. It is a good plan to bed the shed down with peat moss or straw. Sometimes farmers have some rough short chaff. This can be used to advantage for the floor of the shed, but when bedding has to be purchased peat moss will be found much more durable. Some perches should be put in the

shed about 2 feet from the ground, as the birds are fond of pluming themselves on them. Also provide a dust bath for them. Turkeys are usually sold by weight, so the principal thing to have in view is to get them heavy, and to this end and purpose everything should be done to make the food as appetising as possible. The more food they eat and digest the better. If the feeder notices they are tiring of their food, it should be instantly changed, for if their appetites are poor they will soon lose weight instead of gaining it.

As regards food, barley meal, oatmeal, locust meal, and ground oats, mixed with fat and skim-milk (made warm), is the best mixture for soft food that they can possibly have. Some sharp grit should be mixed in it, as this materially aids digestion. If the food is mixed soft, and only given in small quantities at a time, the birds like it better, and they do not need any water after it. It is always a good plan to avoid giving water after soft food to fattening stock, if possible; if not, so much food gets wasted away before the birds derive the slightest nutriment from it. If the turkeys are fed with this soft food at eight o'clock, then they should have another meal of it at one o'clock, with grain (boiled maize and barley) just before dark. If the birds eat this well, it will astonish the owner to see how quickly they will get fat. Fourteen or eighteen days' fattening will have the desired effect. A little green food can be given in the morning for them to peck at if they seem inclined to such employment. The turkeys should be fed out of a large trough; and, if this is placed 7 inches high, there will not be any waste whatever.

Now as to the stock turkeys. Some breeders make a great mistake. They know that the biggest birds fetch at Christmas a high price, and, being anxious to realise the most money possible, they let their best and biggest birds go, and have to breed from smaller birds. The best birds should always be retained for breeding, and the others must receive generous treatment, to get them into good condition, so as to realise as high a price as possible. The finest hens must be selected, and a cock of very heavy weight procured from an unrelated strain. £5 is frequently paid for a first-class cock for breeding table birds. This may seem a high price, but the cost is soon repaid by the increased size of the young stock.

Many inquiries are made as to which is the best breed of turkeys. The Cambridge bronze is my favourite. They are excellent birds, growing to an enormous size if well and hardily bred. They are of a beautiful bronze colour, looking remarkably handsome in the sunlight. My idea is they are more useful, as well as more striking, than the black Norfolk variety. The flight feathers (of the wings) are edged with

white, and the short tail feathers and the feathers on the rump are also edged with white. The tail of the cock looks very pretty when he has it spread out, as the white tip to each feather makes an edge of white all round the tail. A healthy turkey cock spends most of his time with his tail spread out, strutting about. It is generally a good sign that if a turkey cock has his tail out well he is in good health, whereas if he hangs it down and mopes about he is out of sorts, and should receive immediate attention. When one has a heavy turkey cock, be careful to notice whether he is too heavy to altogether run with the hens, in which case he should be penned, and only allowed in the hen pen for an hour each morning. The Cambridge bronze hens are marked much the same as the cocks, save that the breast feathers are tipped with white. The top part of the shoulders is bronze, but not so distinct as in the male birds; the wings and tail are tipped with white, but the tipping is not so wide as in the cock.

Increased interest is being taken in turkey breeding. This is as it should be, for if the birds are properly managed, and the owner has a nice place at his command, turkey breeding can be made very profitable. One turkey cock may run with from seven to twelve hens if he is an average weight. Many people rear turkeys now in small places. The secret lies in keeping the young ones from all draughts and out of the rain when they are delicate. Care is needed when they are very young, but after they have their breast feathers they are quite strong. Do not keep stock birds in small runs, as they do not then breed healthy progeny.—*Live-Stock Journal.*

7.—*On the loss of Nitrogen from decomposing Organic Matter, and the means of diminishing or preventing it.* By Dr. H. v. Krause.*

When organic substances decompose, nitrogen may be liberated and lost in two ways—by oxidation of ammonia, which is a compound of nitrogen and hydrogen, into nitric acid, a compound of nitrogen and oxygen—during which change some nitrogen is set free; or by reduction of nitric acid into ammonia, and finally into nitrogen. The latter change seldom occurs in nature, and never in the preparation of animal manures.

* Abstract of a paper in the German 'Journal of Agriculture.'

The means which have been adopted to prevent the loss of nitrogen by the former changes depend either upon the prevention of oxidation—by excluding the air, or paralysing the fermenting agent—or upon converting the nitrogen compounds resulting from the fermentation into stable substances.

The author's experiments were made upon cow's urine, to discover—

(*a*) How far the following substances acted as preservatives; and

(*b*) In what quantity they ought to be applied.

1. *Superphosphate.*—The result of the experiment is to show that superphosphate, when added to the urine in the proportion of 1 per cent., forms an excellent preservative. For its application a manure-yard is needed from which the rain is excluded. The richer the superphosphate in soluble phosphoric acid the better it acts.

2. *Superphosphate and gypsum.*—This acts less actively than superphosphate, and therefore it required four times as much to produce the same result; upon adding 5 per cent. to the urine no loss of nitrogen took place. The author considers the superior preserving power of superphosphate due to the much larger quantity of soluble phosphate which it contains.

The exclusion of air had very considerable influence in retarding the fermentation and consequent loss of nitrogen, as it prevented the growth of those organisms which, with the help of the oxygen of the atmosphere, convert ammonia into nitric acid.

3. *Gypsum.*—This prevents a loss of nitrogen when applied in sufficient quantity, the loss diminishing with the increase of gypsum used. The author finds, however, that gypsum frequently promotes fermentation and loss of nitrogen. Gypsum cannot therefore be unconditionally recommended as a preservative.

4. *Kainit.*—This acts to a certain extent as a preservative, its power of preventing loss increasing with the quantity employed, the same as with gypsum.

As is well known, kainit is a sulphate of potash. In order to discover whether its action was due to its being a sulphate or a potassium salt, experiments were tried with the chloride of potassium and the chloride of sodium (common salt). Five per cent. of salt proved a better preservative than the same quantity of potassium chloride. Hence the action of kainit appears to be due to its being a sulphate.

The action of kainit lasted only for a short time, after which there was a rapid loss of nitrogen. Kainit therefore can only be employed when dung is to remain but a short time in the yard before being used. Even then it is doubtful whether the

application is advisable, as it might promote fermentation in the soil and loss of nitrogen, especially as the manure would then be in contact with the air.*

5. *Thomas's or basic slag.*—The author's results may be summarised in the few but important words—Thomas's slag is to be entirely rejected as a preservative.

6. *Peat-mould.*—In small quantities this increases the loss of nitrogen, and even in large quantities it cannot be recommended.

7. *Water.*—This only increased the rapidity of fermentation.

The general result of the investigation is to show that the loss of nitrogen is least when there is least contact with air. Hence it would appear that with solid dung the least loss arises when the manure is well trodden, and not moved from one place to another. With liquid manure the chief consideration must be to keep it in as tightly closed a receptacle as possible.

8.—*The Chemistry of Cheese-Making.*† By ALFRED SMETHAM, F.C.S.

THE Lecturer said his object in coming before them was not to teach them how to manipulate the churn and the butter-worker, nor how to treat curd in the vat, but rather to point out a few scientific facts which had a practical bearing on their manufacture; and to do that he thought it would be best to begin by letting them have some knowledge of the raw substance with which they had to deal, namely, milk.

The lecturer then proceeded to point out, by means of bottles containing the separated constituents of a pint of milk, that practically nine-tenths of milk was water, which was worthless so far as dairying products were concerned; but there was a considerable amount of butter-fat. The butter-fat in milk was its most valuable constituent, but its proportion varied from a variety of causes, such as the breed of the animal from which the milk was obtained, and the length of time that had elapsed since calving. The quantity of butter-fat must therefore be looked upon as variable, but, as a rule, from a mixed herd of Shorthorns it might be reckoned at 3½ per cent. Besides the butter-fat there was the casein or curd, the portion separated by rennet, and about 0·6 per cent. of albumin, which, unlike the

* [This opens up the question as to the advisability of applying kainit to a soil recently manured with dung.—ASSOC. ED.]

† Notes of a Lecture delivered at the Annual Meeting of the Cheshire Dairy Institute, and revised by the author.

casein, was not curdled by rennet; and in addition there was a considerable proportion of sugar, called milk-sugar, resembling common sugar in many ways—being sweet and soluble in water—but differing from it in constitution. In addition to these, milk contained a small proportion, 0·7 per cent. of mineral matters or salts, consisting chiefly of phosphates of lime and potash, which so far as dairying was concerned played but a subsidiary part.

It was not unusual for some cheese-makers to take some of the butter-fat from the night's milk before adding it to the morning's milk; but he did not advocate any such practice, and preferred the use of the whole milk if they wanted a really first-class cheese.

Now, if milk could be drawn directly from the cow into a chemically clean bottle and hermetically sealed, it could be kept sweet for an almost indefinite period. He had proved it, having examined a sample of milk that had been kept by these means for three years after it had been drawn from the cow, and it was then found to differ very little from ordinary fresh milk. The cause of milk going bad, he proceeded to show, was the lactic fermentation set up from its very first contact with the air and with the dairy vessels into which it was received—which were not always clean, though thought to be so. The fermentation was brought about by a minute organism, which commenced immediately to grow and develop in the milk, in the same way as the yeast plant grows in a sugar solution. In order to arrest the development of the lactic ferment as much as possible, absolute cleanliness in all dairy vessels should be insisted on, and milk should be cooled down as quickly as possible. A great deal also depended on the position of the dairy, which should be removed as far as possible from manure heaps, shippons, pig-styes, and silage stacks; from everything, in fact, at all likely by decomposition to promote the growth of organisms, which might by their subsequent development taint the milk.

The next thing in connection with cheese-making was a knowledge of the qualities of the rennet used, which should be of sufficient strength to coagulate the milk to a consistency fit for cutting in forty-five minutes—at all events, in not longer than an hour. Either a longer or a shorter period than these was undesirable. A lower temperature was necessary for development in the early-ripening process than was required by the "old" method. The higher the temperature of the milk at the time of setting the closer would be the casein, and the more perfectly would the milk-sugar be removed from the curd.

The proper degree of acidity could at present only be tested by taste or smell, but as lactic acid had no smell, it was impossible by the latter means to tell whether it was there. He must

confess there existed at present no simple apparatus by which the amount of acidity could be readily ascertained, and although methods had been advocated, they required simplifying before they could be brought into general use. Having determined the amount of acidity, however, nothing but practice would tell them when it had developed sufficiently to produce a desired result. It needed careful and scientific investigations to determine the nature of the acids produced during the processes of ripening. They did not know the action of the butyric ferments, the conditions under which they could grow, and the chemical changes brought about by them. Therefore, though they were able to point out the lines on which skilful cheese-making must go, it would be of advantage to the dairy farmer and to science if they knew more about the life history of these minute organisms. That could only be acquired by specialists, who were enabled to devote their time without payment to years of hard work. At present, therefore, he was unable to go further than science permitted, but he was able to go thus far, that the practical worker must keep the process of fermentation under control. It was important to know as nearly as possible the right amount of acidity, for if the curd contained too little acid, the cheese would be spoiled, and if the fermentation were allowed to go too far, the cheese would also assuredly be spoiled.

The next thing, without going into the details of manufacture, was the salting. Salt acted as a sort of poison to the ferment, and if fermentation was found to be acting too quickly it might, to some extent, be controlled by salt. The best plan of introducing the salt when not required to check fermentation at an earlier stage was to put it with the curd through the mill, and mix it perfectly. The curd should go through the mill twice.

If they wanted to make a good cheese, which would take months to ripen, care must be taken to get rid of the whey as completely as possible; but if cheese was wanted to go to market in six weeks or three months, all the whey must not be got rid of. He, however, did not advocate the latter class of cheese-making, and did not believe it was wise that either tradesmen or Cheshire farmers should have early ripening cheeses. The price was always lower than that of the first-class article, and the only redeeming feature of the practice was that the money was turned over quicker. If nothing but first-class cheese were manufactured the public taste would be educated, and the higher prices obtained would far more than compensate for any supposed advantage from getting a quicker return of money. Proper attention in the drying-room was very desirable, but it was a simple question of convenience in handling the cheese.

The next point was the ripening of the cheese; and here, let him say, that although it was quite possible to spoil the very best cheese in the cheese-room, it was impossible to remedy at this stage any previous defects in the manufacture. They might spoil a cheese in the cheese-room, but they could not make it there. The cheese-room should have a temperature of 65°, be well ventilated, and should have an aspect that would as nearly as possible give those conditions. The reason for maintaining an even temperature was that the fermentation proceeding in the vat, in the press, and still going on in the cheese-room, should not be retarded, but should go on evenly. His theme from beginning to end was, it would be observed, fermentation! fermentation!! fermentation!!! All he had said, in fact, had been intended to show what were the causes of this fermentation, and to enable them, if possible, to utilise the means which the teachings of science placed at their disposal of checking the ferments and keeping them under control. If they knew what they wanted to do, the work became very much easier when they had to do it.

9.—*The "Albuminoid Ratio."* By R. WARINGTON, F.R.S.

THE phrase "albuminoid ratio" is now pretty generally adopted by English writers. In America the term employed is "nutritive ratio." The original German phrase is "Nährstoffverhältniss." All these attempt to express the same idea—*the ratio, or proportion, of the albuminoid to the non-albuminoid digestible constituents of food.* If, therefore, we speak of barley as having usually an albuminoid ratio of 1 : 8, we imply that when sheep or oxen are fed with barley of average composition, the animal digests, and receives into its system, eight parts of non-albuminous food for every one part of albuminous food.

The idea attempted to be expressed by the "albuminoid ratio" of a diet is thus a very simple one; there are, however, several facts to be borne in mind which somewhat complicate the subject. In the first place, every food contains several non-albuminous constituents, and these have not the same feeding value. The chief of these non-albuminous constituents are fats, starch, sugars, and fibre. Of these the fat is much the most valuable.

As the proportion of fat in different foods varies extremely, being not more than 2 per cent. in wheat or barley, and more than 15 per cent. in some cakes, it is necessary, in order to place different foods on the same footing, to take into account this especially high value of fat.

It has been usual to reckon one of fat as equivalent to two and a half of starch, and to assume that sugar and digestible fibre have the same value as starch. The amount of fat has, therefore, been usually multiplied by two and a half, and the product added to the sum of the other non-albuminous constituents, the total thus representing the whole of the non-albuminous constituents *reckoned as starch.* We have, then, to bear in mind, that for the purpose of the albuminoid ratio, the whole of the non-albuminoid constituents of any food are reckoned as starch.

The method usually adopted is not, however, perfectly accurate. The researches of Frankland, Stohman, and Rübner have shown that fat is not exactly two and a half times the value of starch; nor are starch, the sugars, and cellulose of precisely the same value. The most recent results show the relative values of equal weights to be about as follows:—

Fat	2·29
Starch	1·00
Cane Sugar and Gum	·97
Grape Sugar and Milk Sugar	·90
Cellulose (about)	·86

We shall thus obtain the albuminoid ratio more accurately if we reduce the various non-albuminoid constituents to their value in starch by multiplying each by the respective factors just quoted.

A far more serious source of error arises from the fact that in many of the ordinary analyses of foods the nitrogen of the amides and of the nitrates * present is reckoned as if it existed as albuminoids; the analyst, in fact, has not determined the albuminoids present, but he has determined the amount of nitrogen, and then reckoned that the whole of this nitrogen was present as albuminoids. It is clear, then, that when amides or nitrates are present in the food analysed, the amount of albuminoids shown in the analysis is always in excess of the truth. When the Germans employ this imperfect method of analysis they term the result arrived at "Rohprotein," that is "crude protein," but English analysts are unfortunately not in the habit of giving this warning. It would be better if the calculated result from the total nitrogen present was always designated as "nitrogenous substance," and not as "albuminoids." The present state of matters is a survival of an old practice. Formerly no method was known for determining the true albuminoids in a food, nor were chemists aware that amides were always present in certain descriptions of food. Now analysts have good methods for determining the true

* The nitrogen of the nitrates is rarely estimated in food analyses.—Assoc. Ed.

albuminoids present, but as yet they generally adhere to the old and easy method of determining the total nitrogen, and then multiplying its quantity by six and a quarter. It is certainly surprising that with good methods in their hands so little has been done by chemists to determine the amount of true albuminoids in various foods, and that so little use has hitherto been made of the facts which have been ascertained. It must always be borne in mind that the German ratios are still based on the quantities of total nitrogen; they are therefore in many cases not "albuminoid ratios," but simply the ratios of nitrogenous to non-nitrogenous matter.

The error we have pointed out occurs, however, only with certain classes of food. Ripe seeds of all kinds contain only a small proportion of amides,* unless germination has commenced. Ripe straw contains also but a small proportion. On the other hand, all green fodder crops, roots and tubers, contain a considerable amount of amides, and nitrates also may be present. In young grass 25 per cent. of the nitrogen usually exists as amides; in potatoes 40 per cent.; in turnips 50 per cent.; while in mangolds 63 per cent. of the nitrogen is in the form of amides and nitrates, only 37 per cent. existing as albuminoids. In well-made hay the proportion of non-albuminoid nitrogen is less than in young grass or clover. In silage, on the other hand, the amount of non-albuminoids is much increased. In sour silage one-third of the albuminoids originally present in the grass or clover has generally disappeared, the nitrogen of the altered albuminoids remaining in the form of amides or ammonium salts.

One point further must always be borne in mind in calculating the albuminoid ratio of a food; namely that we have to deal exclusively with the *digestible constituents* of the food. The necessity of this is obvious, for it is the character of the food assimilated by the animal that we desire to know. If a sheep receiving undecorticated cotton cake digests only 16 per cent. of the fibre present, while it digests 74 per cent. of the albuminoids, it is evident that to the sheep the cotton cake is a very different material from what it appears by the chemist's analysis. The determinations of the proportion of each constituent digested by an animal we owe almost exclusively to German experiments; in using their figures we have, however, to bear in mind that the numbers showing the percentage of albuminoids digested are always calculated from determinations of the *total* nitrogen in the food and excrement,

* For an explanation of this term see Sir T. D. Acland's paper on "The Chemistry of Farming," Third Series, vol. xx. p. 297.

and consequently do not correctly represent the digestibility of the albuminoids. The digestibility shown for the albuminoids of the food is indeed always in excess of the truth in those cases in which amides or nitrates were present, as these are easily soluble bodies, and pass readily into the system without the aid of any digestive process. It is, however, quite easy, if we know the percentage of amides and nitrates in a food, and assume that they are entirely digested, to calculate from the German figures the percentage of true albuminoids digested.

In the following table we give a few illustrations of the ratio of albuminoids to non-albuminoids in some common foods, assumed to be of average composition. In a second column is given the ratio of nitrogenous to non-nitrogenous substance; this latter ratio will correspond nearly with those quoted by Wolff; but, as we have already seen, such ratios cannot properly be called albuminoid ratios.

	Albuminoids to Non-Albuminoids.	Nitrogenous to Non-Nitrogenous Substance.
Cotton Cake (decorticated)	1 : 1·4	1 : 1·2
Linseed Cake	1 : 2·6	1 : 2·3
Beans	1 : 2·7	1 : 2·3
Brewers' Grains..	1 : 2·9	1 : 2·8
Malt Dust	1 : 4·2	1 : 2·6
Wheat Bran	1 : 5·5	1 : 4·2
Oats	1 : 5·9	1 : 5·4
Pasture Grass	1 : 6·4	1 : 4·0
Barley	1 : 8·0	1 : 7·3
Clover Hay	1 : 7·5	1 : 5·0
Meadow Hay	1 : 9·5	1 : 6·9
Maize	1 : 10·9	1 : 9·0
Turnips	1 : 12·1	1 : 5·8
Potatoes	1 : 23·5	1 : 12·2
Mangels	1 : 24·1	1 : 8·6
Barley Straw	1 : 108·0	1 : 53·8

We will now turn to the practical aspect of the subject. The advantage of knowing the albuminoid ratio of a food arises from the fact that albuminoids play a specially distinct part in nutrition. From the albuminoids the whole of the muscle and the other nitrogenous tissues of the body are formed; no other constituent of the food shares in this function. The non-albuminoid constituents of food serve for the production of heat and work in the animal body, and for the production of fat.

The demand for albuminoids in the animal body is very different at different stages of its existence. A very young animal requires for rapid development a food rich in albuminoids: this fact is plainly indicated by the composition of

milk. The albuminoid ratio of the milk of various animals is, on an average, as follows:—

Sow	1 : 2·2
Ewe	1 : 3·1
Cow	1 : 3·6
Goat	1 : 3·7
Ass	1 : 4·2
Mare	1 : 4·4

If, then, we wish to imitate nature, we must supply a young animal with a diet rich in albuminoids. Linseed, and pea meal, are both well known as excellent additions to the food of young animals. As the animal grows, the proportion of albuminoids in its food may be diminished.

When an animal is fully grown it can be kept in a store condition most economically by feeding with a limited quantity of food poor in albuminoids. The animal has now no increase in muscle to produce, it has merely to replace the daily waste of tissue; the other functions of its body can all be maintained by the non-albuminoid constituents of its food. If to such an animal any excess of albuminoids is given over its actual requirements, the waste in the system becomes greater, and the cost of maintaining the animal is increased. Store cattle and sheep are generally supplied with straw-chaff, and roots; greater economy is, however, obtained when the food is less bulky; and the amount of water consumed by the animal is thus diminished. Maize is apparently the most perfect type of a maintenance diet.

If work is demanded from the adult animal, the quantity of food supplied must be increased in proportion to the amount of work required, but the proportion of albuminoids in the food is not necessarily to be raised. This fact has been but slowly recognised; it is confirmed, however, by a multitude of practical trials made both on men and horses. In Wolff's recent experiments with horses, the ratio of nitrogenous to non-nitrogenous substances in their diet was diminished from 1 : 4·4 to 1 : 7·3, without any deterioration in the labour value of the diet being apparent.

Work is performed by the energy obtained by the combustion of organic matter in the muscle; it is indifferent whether this organic matter be nitrogenous or non-nitrogenous. When an animal is doing accustomed work, or in other words, is "in training," the daily waste of muscle is no greater than when at rest. Severe unaccustomed exertion is attended with an extra waste of nitrogenous matter. A diet tolerably rich in albuminoids would thus be advisable during training.

The comparative values of the different constituents of food already given, express their relative capacity for the production

of work. Albumin has a slightly higher value than starch, their comparative values being:—

Starch, 100; Albumin, 107.

The horse has only a small power of digesting vegetable fibre. Foods like hay, and especially straw-chaff, are suitable only for a maintenance diet, or light labour. For hard work, the hay and straw must be diminished, and more digestible foods substituted, as oats, maize, or beans. In choosing what grain shall be purchased for a working horse, the farmer will be chiefly guided by its market price, the proportion of albuminoids present is sure to be sufficient. The various horse foods must, however, be combined with judgment, as some of them, as maize and bran, are more laxative than others.

We pass next to the milk-yielding animal. We have in this case a daily production, in large quantity, of a liquid rich in albuminoid matter; with this condition there is frequently associated the production of young. The supply of albuminoid matter in the food required by a cow in full milk, if measured by the quantity of albuminoids in the products yielded, is thus greater than that demanded by any other animal on the farm. The products of the cow—milk and calf—have all of them a high albuminoid ratio; the albuminoid ratio of cow's milk being 1 : 3·6, and that of a newly-born calf about 1 : 2. Every condition thus points to the necessity of a high-albuminoid ratio in a diet suitable for a cow in full milk. The maintenance diet of a dry cow may contain only a small proportion of albuminoids, and the feeding is most economical when this is the case; but when the cow is in calf, and still more when it is in full milk, the proportion of albuminoids in the diet must be considerably raised if the animal is to be properly sustained.

The young grass eaten on a pasture is seen by the figures already given to be a food tolerably rich in albuminoids (alb. ratio 1 : 6·4); young clover will be still richer. A good pasture will supply a food suitable for an average production of milk. When, however, a pasture is not full of young grass, or if the milk production is above an average, additional food, rich in albuminoids, should be given. When a cow is in a stall, and fed with hay, straw-chaff, and roots, the addition of a considerable amount of rich nitrogenous food is still more necessary if the cow is to do her best. The foods recognised as especially suitable for a milking cow, as brewers' grains, wheat bran, bean meal, and cotton cake, are all characteristically rich in albuminoids, as is shown by the table already given. It is, however, quite impossible to give, as is sometimes done, a fixed albu-

minoid ratio for the diet of a milking cow, for the simple reason that its requirements vary so greatly in different stages of its lactation; the yield of milk by different cows is also very various. A better plan is that adopted by Sir J. B. Lawes at Rothamsted, in which the milk given by each cow is every day recorded, and the supply of cotton cake and bran is raised or diminished with the rise or fall of the yield of milk, the other foods being given *ad libitum*. It is impossible by the best feeding to turn a badly milking cow into a good one; but it is possible by sustaining the cow with proper food at the period of her greatest milk production to prolong that profitable period very considerably.

We come lastly to the case of the fattening animal. The increase which a fattening animal puts on is chiefly fat, a non-nitrogenous substance, and the albuminoid ratio of the animal increase is only 1 : 20. It is now admitted on all hands that fat is certainly formed in the animal from carbohydrates. The German digestion experiments show indeed that a diet poor in albuminoids is somewhat less fully digested than one richer in these constituents, but as the mischief only begins when the albuminoid ratio is lower than 1 : 8, this fact can hardly have much weight in determining the present question. If we look at the results of careful feeding experiments, we find abundant evidence in the case of pigs and sheep that a diet of no higher albuminoid ratio than 1 : 8 is capable of giving excellent results as a fattening food, if it contains a considerable amount of cereal corn; for a fattening diet must always be a concentrated diet. The advantage to be gained by the use of cake is that, being a very concentrated food, it enables us to prepare a fattening diet from such poor materials as mangel and straw-chaff.

If we are asked what foods at the present time are the most economical to fatten on, we reply without hesitation the nitrogenous foods, and especially cotton cake. We answer thus not because of any special superiority in the fattening quality of nitrogenous foods, but because when a farmer feeds largely with cake, or with other nitrogenous food, he obtains, in addition to a fat animal, a *very valuable manure*. This fact will remain only while the prices of such foods as cotton cake, beans, peas, and lentils are so near to those of the cereal grains. If the former foods were considerably to rise in value the advantage of using them would cease. As it is the value of the manure which turns the scale in favour of the nitrogenous foods, it must of course be borne in mind that to secure this advantage the manure must be protected from rain; if this is neglected, the cheapest fattening food, as maize, may prove the most economical.—*Live-Stock Journal Almanac.*

10.—*Success in Shorthorn Breeding.* By R. Stratton.

There are probably few breeds of animals of which there are so many different types as the Shorthorns. This being the case, it is difficult to find a general accord among leading breeders as to what is Shorthorn excellence. This has had a prejudicial effect upon the breed generally; for instead of endeavouring to adopt the best qualities of the various types which would have improved all, breeders have stuck steadily each to his own type, and inbreeding, carried on to a reckless and ridiculous extreme, has led to an accentuation of faults and serious loss of constitutional vigour, for which many breeders have had to pay dearly.

"How to breed?" First, make up your mind what you want to breed; but be quite sure that you have taste and judgment for the business, for it would be a mistake to suppose that anybody may be a successful Shorthorn breeder.

Every breeder should know as soon as a calf is born, certainly when it is a month old, whether it is good, bad, or indifferent, and skill in Shorthorn breeding is shown in knowing and deciding when to get rid of a bull as in knowing how to select one; for it should ever be borne in mind that, however well bred a bull may be, however good his dam, sire and other ancestors, there is no absolute certainty that he may be a good getter. This may be a somewhat humiliating admission, but it is nevertheless true, as every breeder knows, though all will not confess it. Of course, it depends greatly upon the cows with which the bull is mated. A bull that would get bad stock upon one set of cows might get good stock from another lot. The mating may be ill-assorted. For instance, a straight-shouldered bull, if mated with cows having a tendency to straight shoulders, might increase this defect, whereas, if mated with fine-shouldered cows, no harm might result in the first generation.

Having made up your mind as to the type of animal you want to breed—having your ideal clearly in view—mate animals as near that ideal as possible, and stand on the principle that like begets like, that two good animals of a given type are more likely to produce something good like their parents, than two ill-matched ones would be likely to, though some of their ancestors, more or less remote, may have been nearer to the ideal.

The ideal type at which to aim is a matter of taste and requirement. Some look upon milk as all important, others think it of little consequence. My opinion is that good milking

properties ought to be essential in Shorthorns. If dairying is the main object of the farmer, no amount of flesh-making capacity can compensate for deficiency in milk. Then the good milker is the most regular breeder, does her calf better, and, when dry, runs to flesh quicker than the other. Moreover, a Shorthorn should be a good all-round animal, unsurpassed in milking qualities, unequalled as a grazer, and in quality of flesh inferior only to the Devon and the Highlander.

I do not say that the average pedigree Shorthorn of the present day comes up to this standard; far from it. Owing to the craze for pedigree, injudicious line breeding, and generally unskilful management, the average Shorthorn is lamentably deficient in many of the points I have alluded to, and, in comparison with some other breeds, is fairly beaten in certain special qualifications. But the breeder should aim at an ideal in which the Shorthorn is unsurpassed in any of the above-mentioned points, and as an all-round class of animal is well ahead of any other breed. This is not too high a standard to hope to attain.

Breed, then, on rational lines. Do not suppose that I ignore pedigree, but see that not only the animals you select are good, but that their ancestors were good also, yet do not imagine that remote ancestors are of anything like equal importance to the more recent progenitors. Have them good as far back as you like, but have the last four generations good and all before in oblivion, rather than the last four bad or indifferent and the former dozen good or "well bred," which is too often supposed to mean the same thing.

Breed with a *practical* aim. Remember that roasting beef is worth twice as much per pound as boiling. Let a broad, thick back be the first point, and discard all animals that have not this all-important qualification. Then well-sprung ribs, deeply and evenly covered, and a square, well-developed thigh, the best indication of the proportion of lean meat to be found in a carcass. Of course the general character and quality of a first-class Shorthorn is to be considered, and though from a beef-eating point of view this may be of little account, from a breeder's view it is highly important, though in my opinion there has been a great misunderstanding of the word "quality." The fine soft touch, which has been the admiration of many Shorthorn breeders, has been understood to mean quick-feeding properties and fine quality of flesh; as a matter of fact it is a delusion and a snare. I object to hard handling, which indicates coarseness, but firm handling I maintain to be infinitely preferable to soft handling; for the former indicates flesh and the latter fat, and fat of the worst description. Avoid then, by

all means, the thin, papery hide, and the soft touch, if you want lean meat and good constitutions.

Then, as to "character," there is a certain high-bred look and carriage not easily described but very quickly seen by a Shorthorn breeder who understands his business, that it is most desirable to attain not only on account of its general attractiveness, but it indicates a prepotency, a power of impression that is most desirable in a sire.

A beginner in Shorthorn breeding (and some of the old breeders as well) should examine the pedigrees of the principal winning animals at the Shows. They are almost without exception of mixed blood. No "line-bred" ones will be found among them. It seems to follow, therefore, that line-breeding will not do, and that is the opinion of the great majority of practical, successful breeders. Of course it will be said without the "line-bred" ones you could not have these "mixed" ones in their perfection. Let those believe this who please; I, for one, do not believe it.

I think it by no means difficult to attain to excellence in Shorthorn breeding. Let the ground-work be moderately good, and half-a-dozen crosses of really good Shorthorn bulls will bring a result very near to excellence, and for all practical purposes as good as need be. This fact cannot be too generally known, both in the interest of the farmer (who looks upon Shorthorn breeding as a thing quite beyond his means, whereas at a very small expense he can in the course of a few years improve his stock from 25 to 50 per cent.), and also of the breeder of pure Shorthorns who wants an extensive market for his bulls.

It is with the superlative degree that the great difficulty comes in, and none but those who have the "gift" can keep to that degree. There is a point beyond which it seems impossible to go, but unless you constantly strive to pass that point you inevitably deteriorate. This seems to be one of the great laws of nature, impelling us onward. Standing still is impossible; forward or backward it must be, and the latter is much the easier.

Some think a Shorthorn should possess immense size; for my own part I incline to moderate size. I think it a mistake to suppose that very big animals are necessarily the most profitable. Speaking generally, they eat according to their size. A big beast is a slow feeder, and his quality is not equal to one of smaller scale. I am inclined for moderate size, light bone, quick-feeding properties—such animals when fat afford the largest proportion of the best meat.

The present mode of feeding animals for exhibition is open to

great objection. Nothing can be more detrimental to breeding than the excessive feeding now practised; yet if any system of disqualification of fat animals were adopted, there would be great danger of prizes going to thin-fleshed animals, on the assumption that they had not been highly fed, whereas as a matter of fact they might have been as highly fed as others carrying double the weight of flesh. This would be a greater evil than the present system. Milk, of course, is the thing to put on the polish, but I would make every exhibitor sign a declaration that his exhibit had never taken milk after it was one year old. Suffice it to say that if animals are bred right there is not much difficulty about the feeding.

If the breeder wants a sound, strong-constitutioned herd, let him keep his stock generously, and, as far as possible, naturally, giving always plenty of exercise and plenty of good, wholesome food; but he should know that too liberal feeding of young females tends very decidedly to deterioration of milking properties.

To succeed as a Shorthorn breeder you must have a thorough love of Shorthorns, be a natural judge, and keep one object in view, viz. the production of the best. This may not be the most *profitable*, because "fashion" is sometimes more profitable than merit. Do not be overburdened with length of pedigree, but act on the great principle of selection of the *best* and the best-bred.—*Bell's Weekly Messenger.*

11.—*Manure Adulteration.*

In a Lecture given before the Norfolk Chamber of Agriculture, Mr. Thomas Brown, of Lynn, in speaking upon this subject, said:—

> "I desire to call your attention to one or two facts that I deem of prime importance, and which I will simply bring to your notice without comment.
>
> "1. It is calculated that over a million tons of artificial manures are used annually in this country.
>
> "2. Assuming each farmer to use 10 tons on the average, we have over 100,000 manure-consuming farmers.
>
> "3. The number of samples of artificial manure sent to the Royal Agricultural Society's laboratory is about 500 annually. We may assume, I think, that this laboratory receives a moiety of the samples that are tested. If we assume four times as many are tested in local laboratories,

we shall note that then only 2 per cent. of the consumers of artificial manure concern themselves about the quality of their purchases. This fact is not concealed from the dishonest manure merchant.

"4. Seldom does a half-year pass without the Chemical Committee of the Royal Agricultural Society bringing prominently before the agricultural public cases of gross fraud or adulteration that have been detected in their laboratory. Yet we may assume this laboratory tests only 1-200th part of the bulk delivered to farmers.

"5. The President of the Manure Manufacturers' Association, a few weeks since, by means of an address to the Royal Agricultural Society, called the attention of the public to the existence of what must be described as wholesale fraud.

"I estimate the direct loss to agriculture through the sale of inferior and worthless manures to amount to an annual sum represented by seven figures. A far larger sum is lost indirectly in the resulting deficient crops, which indirect loss farmers can compute better than I."

It is somewhat strange that although the Reports of the Royal Agricultural Society have been published for years, and the wide extent of adulteration in manures has been continually impressed upon farmers, this lecture seems to have created an amount of interest in the matter seldom, if ever, before equalled.

There have been several causes at work to bring about this result. We must remember that it is not only the farmer who suffers, but also those manure manufacturers who make good manures and must consequently ask a good price. These are very heavily handicapped by the dishonest trader, who can naturally afford to sell rubbish for less than they can sell good manure.

The leading manure manufacturers of the country have formed an Association which for years past has been doing silently good work, little known to the public.

At a meeting of the Association last year the following resolution was come to :—

"It is desirable in the interests of the trade that for the future the percentage of soluble phosphate guaranteed shall be branded in a conspicuous place on each bag of superphosphate sold for the home trade."

Mr. Hermann Voss, the President of the Association, thus explained the reason for the action taken in a letter sent to the leading Agricultural Societies :—

"The Association, having heard of low grades of superphosphate being sold without sufficient distinction as to quality, considered it would be to the interest of consumers and manufacturers alike and avoid any misunderstanding, by agreeing to distinctly brand the guaranteed minimum of soluble phosphate on the bags. I have no doubt this resolution will be received with satisfaction by your Society, and that you will advise your members to see that for the future all bags containing superphosphate purchased by them be branded in the manner agreed upon."

This is a step in the right direction, and when we remember that it has come spontaneously from the manufacturers themselves it speaks volumes in their favour, and shows that if farmers would be more careful in buying from reliable sources there would be less fraud.

We think the Association would do well to publish the names of the firms who belong to it—not only for their own sake but for the protection of the farmer—and should any member fail to comply with the regulations of the Association he should be struck off the roll.

But we must give a word of warning to our readers, well stated by a writer in the 'Farmers' Gazette':—

"Branding the bags with the percentage of soluble phosphate will not, of course, afford absolute security, because an unscrupulous dealer might put superphosphate, testing only 20 per cent. or less of soluble, into a bag marked 26 per cent.; but this would be a positive breach of warranty, whereas now, the bags being unbranded, and nothing said about the quality, there is no warranty whatever."

The necessity for every farmer to have the manure he purchases analysed still remains, and we cannot too strongly impress upon those who are best able to afford these analyses, that it is a duty they owe not merely to the public and the honest manure merchant, but especially to their poorer farmer friends, to expose and prevent fraud by every means in their power.

12.—*The Hygiene of the Pig Herd.* By Professor Axe.

How to keep pigs in health is a problem concerning which differences of opinion might reasonably be expected and allowed; for while it may be urged that the principles of hygiene appli-

cable to human and animal health in general are equally adapted to the requirements of the pig, it cannot be said that the non-observance of those principles is inconsistent with a high standard of health in this animal. Nothing can be more striking than the perversity of the pig in regard to common health rules, most of which it violates with impunity, and grows fat under conditions which sanitary science has declared to be inimical to life. The habits and instincts of the hog are pre-eminently filthy. It revels in dirt and putrescence, and thrives under the worst combination of sanitary circumstances. Foul water, foul food, and impure air are the chosen elements of its existence, and notwithstanding this its flesh is among the most delicate and savoury of human food; and, strange to say, its general health-rate is higher than that of any other of our domesticated animals. It cannot, however, be said that this exceptional freedom from disease is in any way referable to its indifference to dirt, but rather to its natural tolerance of it. In a measure also it may be due to the fact that swine are destroyed young, and but few are permitted to suffer from those numerous ailments naturally begotten of age and decay. Probably it may also be that the absence of occupation and its contingencies, which conduce so largely to disease in some of our animals, and the peculiarly restricted character of its movements and relations, tend to limit its liability to disease. Notwithstanding all this, it can hardly be doubted that, however tolerant of filth the pig may be, the highest standard of health can only be attained by the observance of sound principles of hygiene and sanitation.

In swine, as in all other descriptions of live stock, the establishment and propagation of a healthy race must begin with the parent, which, above everything else, should inherit a sound and vigorous constitution.

If these qualities are needed in one parent more especially than another it is in the dam, who has not only to afford sustenance to the embryo, and build up the framework of the future organism, but likewise to nurse and to nourish the offspring during the early and most important period of extra-uterine life. Much of that robustness of frame and constitutional vigour which mark the adult life of many animals are laid down and established in them during the infantile period by an abundant supply of that rich natural aliment which healthy well-nourished dams afford. It is of special importance, therefore, in order to lay down a foundation on which to build up healthy stock, that strict attention be given to the selection and management of the sow. As the first consideration, besides a robust constitution we should seek to obtain a high form of development of the

frame generally, and of the lacteal apparatus in particular, that an abundant supply of sustenance may be insured to the offspring. On this point Mr. Sanders Spencer says a sow should have from twelve to fifteen teats on each side, placed at equal distances from each other, so as to afford ample convenience of access to the young. In considering the question of health in the young we cannot altogether disregard the temperament of the dam. Irritable, ill-natured sows, however robust they may be, seldom do that justice to their families which mark the maternal career of the quieter and better disposed class of matrons. Many sows are so constituted as to be made furious by ordinary disturbing causes—a sore teat, chapped udder, or the irritating effects of the sharp tusks of the sucklings are frequently sufficient to provoke a constant state of excitement and restlessness, while others of a more tranquil nature pay little regard to such trifling discomforts. The influence of temperament on the quality of the milk is now generally recognised by all who are practically concerned with breeding stock, and the ill effects of milk furnished by animals under conditions of excitement and unrest are often very marked. The sudden and repeated attacks of diarrhœa from which young pigs suffer are more frequently than is generally allowed the result of this cause.

In other respects than that of temperament the dam is capable of influencing the health of the offspring adversely. Milk given by the former is liable to acquire deleterious and even poisonous properties under the influence of unwholesome food. Many young swine are lost by feeding sows on animal and vegetable matter in a state of putrefaction, and wash in a sour fermenting condition is equally pernicious. So long as they draw their chief supply of sustenance from the dam, the food of the latter should be sound and wholesome, and scrupulously guarded against contamination by decaying organic matter.

Quantity no less than composition and quality of milk must, of course, be considered in dealing with the health conditions of early life. Fat sows, especially those made up for exhibition purposes, lose their milking capacity, and it is no uncommon occurrence for the entire litter of such animals to die from starvation within a fortnight of their birth. Breeding animals should unquestionably be in good condition at the time of parturition, so as to meet the call which is to be made upon their nutritive resources, but in that state of extreme obesity in which our show matrons are sometimes seen the faculty of lactation has become practically suspended and subordinated to the development of fat. In ordinary circumstances the milking capabilities of the sow vary in different

animals, in different families, and in different breeds, and to maintain a high standard of health in the herd entails the most careful watchfulness and forethought on the part of the herdsman, who will regulate the number of the offspring to be reared by the natural capabilities of the sow. Under the artifices of domestication and selection the powers of reproduction in some breeds seem to have become out of proportion with the powers of milk production. In order therefore to produce healthy and vigorous stock, it is sometimes necessary to reduce the number of the litter to the nursing capabilities of the dam. The system adopted by Mr. Sanders Spencer is to allow yelts to rear not more than six or seven pigs in winter, and eight or nine in summer, while the number allowed to a sow never exceeds ten to twelve. By adopting this course, each sucker gets as much mother's milk as is necessary to give it a good start, and to render trough food unnecessary until the digestive organs are sufficiently developed to deal with it without occasioning functional disturbance of the stomach and bowels, which is such a fruitful cause of diarrhœa. When the litter is too large and the milk supply insufficient, the young are too early drawn to artificial food by the cravings of hunger, with the common result that diarrhœa and wasting impair and undermine the constitution, if they do not immediately destroy life.

The kind of aliment best suited to the requirements of the suckling sow is very much a matter of opinion, but there can, I think, be no doubt that a combination of food stuffs is to be preferred over any single form of aliment. A mixture of oatmeal with bran and sharps judiciously apportioned and administered, supplies an excellent milk-forming dietary, to which the addition of a little salt and malt meal, or sugar, may be made with advantage.

Although adult pigs benefit by a change of food, any change made in that of the nursing sow should not be of an extreme nature, and it should be done gradually, so that no abrupt alteration be induced in the properties of the milk. Whole families of pigs are frequently destroyed by suddenly and without preparation allowing the dam large quantities of grass, roots, or potatoes when for some time she has been deprived of them. This is especially seen where the grass is rank and sour and the roots or tubers are rendered unwholesome by decay.

As the time for weaning arrives, the operation of castration will have to be performed on such of the litter as are not intended for breeding purposes. This in itself is a very simple matter, and is usually carried out by the professional "cutter," the blacksmith, or the herdsman, neither of whom can be said to have any very clear idea of the responsibilities which attach to

the infliction and treatment of surgical wounds. Serious losses frequently follow the operation, and the mishap is usually referred to "cold," or some cause altogether foreign to the event.

When the operation is entrusted to irresponsible men it is the duty of the owner to see that the knife by which it is performed, as well as the hands of the operator, are thoroughly clean, and it is equally important that after the operation the pigs be turned in fresh dry litter, and not into a dirty yard or sty. Decomposing animal and vegetable matter, if allowed to enter wounds recently inflicted, may induce acute blood poisoning and exterminate the entire family.

Immediately and prospectively the process of weaning has an intimate relation with health. All who are experienced in the breeding and rearing of pigs know how important it is to observe certain well-defined rules in severing the connection of the dam with the offspring. In some instances this becomes a very easy matter, while in others a good deal of care and sound judgment are needed. When the litter is a large one, weaning is mainly effected in a natural way—a gradual diminution in the supply of milk forces the young to seek and to rely on artificial food, so that when the dam ceases to be a source of sustenance the offspring are prepared for the entire change which awaits them. On the other hand, when the litter is small, a better and more continuous supply is kept up, and the little ones are led to rely more on maternal than artificial food, and it is under these circumstances that extra precaution is needed in parting the young from the old. When the dam is still affording a large supply of milk at the weaning period, an endeavour should be made to suppress it by diminishing her ration of food; the offspring will then be induced to consume more artificial aliment while still with the dam, thus weaning will be rendered comparatively easy. In any case separation of the youngsters, and the completion of the change of food at which weaning aims, should be effected gradually by allowing the sow to leave her family for longer and longer periods from day to day until complete separation is effected. This done the little ones will require to be fed frequently, say four or five times a day, each time the ration of food being small and easy of digestion, so that the consequences of overloading the stomach may be avoided. No change of diet should be made for at least a fortnight after weaning, but in the winter season it may be desirable to warm the food for a few days after this takes place.

The pig is essentially a meat-making machine, out of whose physiological activities has been evolved a remarkable propen-

sity for growth and maturity even under the most indifferent conditions of sanitation and hygiene; but there can be little doubt that the highest development and continuance of this peculiar quality may be best attained by the observance of sound rules of health.

Upon the question of the kind of food most calculated to meet the economical requirements of pig-feeding, opinions may and do vary, but from a health point of view the superiority of sound wholesome aliment over the foul and putrid combinations too frequently used for the sustenance of swine is obvious enough to all who recognise the intimate relations of dirt and disease. There can hardly be a doubt that a system saturated with filth becomes a ready prey to disease, aud especially to those specific contagious fevers of which swine plague is a too familiar example. The necessity of a sufficiency of food need hardly be urged in the cause of health, but it may be desirable to point out and to emphasise the importance of order in its administration. Pigs, like other animals, should be fed at regular intervals, and the amount of food given should, as far as practicable, be no more than is required for immediate consumption. Want of regularity leads to constant watching and restlessness, and prolonged fasting encourages ravenous feeding and impairs digestion. Variety in the nature and character of food is not altogether unworthy of attention in considering the question of animal health. It is generally conceded that the admixture of different classes of food aids digestibility. According to the best writers, says Parkes, "it is not enough to give the proximate dietetic substances in the proper amount. Variety must be introduced into the food, and different substances of the same class must be alternately employed." The good effect of variety on primary digestion is generally admitted. Moreover, change of diet is a keen appetiser and causes a larger consumption, and consequently a greater supply of the materials of nutrition.

Care in housing is not the least important matter bearing upon the health of the pig. Few of our domesticated creatures suffer so much from a disregard of this requirement. Damp floors and exposure to wet and cold biting winds are chiefly responsible for those numerous cases of rheumatism which abound in our herds and render worthless some of the best specimens of the race. Sties to be healthy should be well drained, well paved, well ventilated, amply supplied with litter, and protected from the east and north.—*Live-Stock Journal Almanac.*

13.—*Some Information from* Prof. Carruthers *upon Ergot.* (Contributed by C. T. D. Acland.)

During the latter part of last summer my attention was called by Prof. Carruthers to a specimen of ergot on some rye-grass near some pastures which he had been examining, and the information he then gave me about it in conversation convinced me how exceedingly important it is that farmers should know ergot by sight, and learn the natural history of it.

Since that time I regret to say that I have very frequently come across ergot, yet have failed to find among a very large number of farmers, to whom I have spoken about it, one who knew it by sight or where to look for it. And yet several were aware that what is called ergot is said to be a cause of abortion, and some of these had for several years been sustaining serious losses by abortion taking place among their stock.

I am sure that very few have any idea of the prevalence of this fungus, and I have never met any one who had any knowledge of how to deal with it.

At the same time I have observed several letters in local newspapers about abortion and miscarriage among the farm stock, and various opinions expressed as to the cause.

I have reason to believe that the loss caused in this manner is very serious and very widespread, though by care and attention much may be done to prevent and to lessen the extent of this source of misfortune.

I have therefore thought it worth while to obtain the consent of Prof. Carruthers (most readily given) to the publication in this 'Journal' of the information which he gave me. It is so clear that I cannot help hoping that those who read it may find it useful, and be able to show to their neighbours who are not members of the Society, another instance of the advantages of membership.

The following reply was sent to a letter I addressed to the Professor, enclosing a postal order for 5*s.*, and asking his advice as to the best method of mitigating this very serious plague.

1*st October*, 1890.

"Dear Sir,

"I am surprised that you have seen so much of the ergot in your neighbourhood. I was a little too early to see it.*

"I have frequently observed it on both the grasses you send (cocksfoot and rye-grass), indeed I have seen as many as twelve ergots on one head of cocksfoot.

* In the beginning of August.

"I do not think you would gain much by cutting the heads off the grasses now that the ergot is there—for the ergot has so slight a hold on the plant that it would, I fear, in most cases fall to the ground. No doubt as many as were carried off the field and *burnt* would be a gain.

"But next year, if the flowering heads were cut when they come well into flower, you would secure the ergot in its early and, as far as I know, innocent condition. The cut-heads need not be collected, as they would not harm the stock. This operation continued for two or three years would lessen, if it did not eradicate the ergot from the pastures.

"The grasses along the hedgerows and especially along the ditches should be treated at the same time.

It will not do to put the ergots in dung. They will not easily rot; and their nature in the condition in which we find them now is to lie dormant till the summer.

"The dung would not prevent this, and they would be thrown on the field perhaps to be more active when the conditions necessary for their active life are present. Certainly they should be burnt.

"The earliest sign of the ergot is a greenish-yellow sticky substance covering the young pistil. But as this is down in the heart of the flower it is not easily detected. It is only when the dark ergot thrusts itself beyond the other seeds that it is detected (see Figs. 1, 2, 3). The injury begins earlier, probably in July, or at latest in August. And no doubt moist weather is most favourable to its growth. I am sure that one thing that greatly helps to its maintenance on land is the presence of grasses that are rejected by stock. If a pasture were all equally eaten down, few seed-heads would be left, and the fungus would not have the plant in a condition in which it could live on it, for it lives *only* on the growing seed. . . . . One object I had in recommending that twelve yards square in the worst part of the park pasture, *i.e.* the part consisting of the rejected grasses, should be turned over was to see if we could not replace them by grasses that would be regularly eaten down, and so afford no accommodation for the ergot.

"My fee is 1*s.*, I consequently return an order for 4*s.*

"I am, faithfully yours,

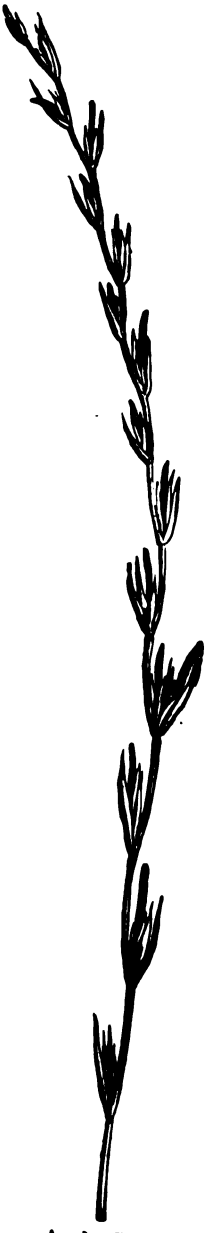
"WILLIAM CARRUTHERS."

I have seen it stated in the local press that ergot is chiefly to be found in the tall rank grass that grows around the droppings of stock. But this is misleading. I have constantly found it in other places, where the grass is not tall or rank. It

Fig. 1.

Timothy Grass
(*Phleum pratense*).

Fig. 2.



Awnless Darnel
(*Lolium arvense*).

Fig. 3.

Barley Grass
(*Hordeum murinum.*)

is clear from the Professor's letter that one of the best ways to prevent the existence, or check the spread of the fungus is to ensure that the grass shall be evenly eaten down. And this I believe may be done to some extent by varying as much as possible the kinds of stock upon the pasture. It is probably for this reason that the practice of putting goats and donkeys with cows has been spoken of as a preventive of abortion, because goats and donkeys will eat grass round the droppings of other animals.

Prof. Carruthers again writing upon this subject in the last number of the 'Journal' of the Royal, says:—

"Ergot begins its attack on the grass when the flower is getting fully developed. It then settles on the tender seed, and uses for its own growth the food which was destined by the grass for filling up the seed. Ergot lives only on the seed, and it cannot appear until the grasses are in flower. It has been met with on most of our pasture grasses, and the ergot from any one of the grasses will in the following year produce seeds (spores) which will reproduce the ergot on any other grass. I cannot refrain from expressing my conviction that very few farmers recognise this dangerous parasite in their pastures, or at all realize the injury it may cause to their stock. The spreading of the droppings would secure the eating down of the pasture regularly, and the little expense incurred would be more than repaid by the gain in the pasture."

The plates here given have been reproduced by permission from the Journal of the Royal Agricultural Society of England (vol. x. New Series, 1874), where a paper by Professor Carruthers on Ergot will be found.

14.—*Horse-Breeding.*

CONSIDERABLE attention has naturally been given to this subject since the appearance of the last 'Journal,' owing partly to the publication of the 'Third Annual Report of the Royal Commission on Horse-Breeding,' and of the evidence taken before the Commission. This formed the subject of an article by Lord Ribblesdale in the 'Journal of the Royal Agricultural Society,' Vol. I., Part II., in which he came to the following conclusions:—

> "There is a good prospect of the revival of horse-breeding upon the best lines and in allegiance to our best traditions.
>
> "What the Commission can do, and what I claim it is doing more effectually every day, is this: it is making the

breeding of half-bred horses possible and reasonable for the farming community, whereas before the Commission got to work, the breeding of half-bred horses by the farming community was hardly possible or reasonable."

At the October Meeting of the Edgeworth Agricultural Society, Lord Ribblesdale again took up the subject of horse-breeding, in which he is so interested, and from his lecture we may quote the following extracts:—

"A good many people to whom I speak about the work of the Royal Commission think that the scale of operations as compared with the area they cover is too small to do much good. I admit the area is large for the money we have. But the action of the Government at present is only to supplement private enterprise, and does not undertake to supply all the horses that are required.

"One of the points we may usefully discuss this evening is the value of the premiums. As you know, this value is maintained for the present year at 200*l.* My view is that the premium must be sufficiently high to be worth a man's while to win it. Lord Portsmouth thinks that lower premiums would enable us to cover a wider area of beneficence with equally high-class and sound horses; but we must bear in mind that even with the 200*l.* premiums a large proportion of the stallions exhibited has each year been rejected for unsoundness, and it may be doubted whether the animals which a lower premium would bring forward would stand the test any better or so well, while the higher class animals would be sold to go abroad or to our Colonies.

"I am not going to take upon myself to-night to tell you how to breed a good horse. I think any such attempt would be a waste of time. Every man's case is so different, and depends so much upon his individual taste, instinct, local and social circumstances, that it is impossible to lay down any general rules for individual guidance, and the practice of horse-breeding as against the theory of horse-breeding must be native and individual. The science of horse-breeding might be styled an inexact science. I will, however, take upon myself to give you one rule to guide you in horse-breeding, and it is a rule which should also guide us all in the conduct and construction of life. Be sure of what you want. You cannot, in horse-breeding or in life, be sure of what you get; but a wise man, if he uses his experience, and by observation, can at least be sure of what he wants, and he will thereby, both in horse-breeding

and in life, save himself time and money. In horse-breeding, keep clearly before your eyes what you want to get, be it a hunter, a harness-horse, a troop-horse, or a hackney. One thing, at all events, can almost be made certain of—I mean, soundness—by selecting a sound mare and mating her with a sound stallion.

"As far as lies in you follow the excellent example, set you in one of the Scotch border counties, of boycotting the unsound horses travelling on your roads by never using them. The Blue-book is full from beginning to end of evidence as to the bad results of using unsound stallions, especially roarers, and you have only to look back into Turf history and tradition to see that it has been ever so. Soundness is now defined for you by the schedule of diseases agreed to as being hereditary, and on that account disqualifying a stallion from winning a premium.

"This is the schedule:—Roaring, ringbone, navicular disease, whistling, unsound feet, spavin, cataract.

"The publication of this schedule in the conditions of entry, not only reduces to a minimum any risk of discontent and disappointment at stallion shows, as an exhibitor knows exactly the questions his horse will have to answer, but it gives you a line for determining soundness in your own breeding operations and selections."

It is very strange to find the advice as to the careful selection of sound mares and sound stallions following so closely upon the statement "that it is impossible to lay down any general rules for individual guidance." We venture to think that such rules can and ought to be laid down, and agree with a writer in the 'Live-Stock Journal' of 14th November, 1890:—

"That 'selection' is the only means known to produce a desired result in breeding, is nowadays generally accepted as a principle that cannot well be disputed.

"Without pretending to be in the least well read in Darwinian theories, it strikes me that although selection is almost an all-potent factor in determining the characteristics of the progeny, still results arise that sometimes make one fancy that possibly qualities acquired after birth by the ancestors may occasionally be inherited in the produce."

The meaning of this word "selection" is well described by a writer in the 'Fortnightly Review':—

"Suppose a person strives to produce two distinct types of horses—the cart-horse and the racer—by selection from

a hundred horses as nearly alike as possible. He at once divides his horses into two lots, the one stronger and heavier, the other lighter and more active. By continually breeding with those which most nearly approach the types required, in thirty or forty years he would be able to produce two distinct forms, the one a fair racehorse, the other an equally good specimen of a cart-horse."

Returning to Lord Ribblesdale's lecture, he continues:—

"You must remember horses go much faster than they did, and have not to cover the many miles they had to in old days. Sir Tatton Sykes rode from Aberdeen to Doncaster, 360 miles, in six days, on one little brood mare, and except being a little stiff, she was none the worse. That's the sort of strain for a Hackney breeder to get hold of, and the distances gaily covered by the hacks of fifty years ago are surprising—but it had to be done.

"Many persons think, too, that richly-endowed short races, and the consequent breeding for speed at high pressure, are robbing English horses of their stoutness, and a friend of mine says we want a fresh infusion of Arab blood to give it us back. I think he is right. The doggedness of an Arab's stamina is remarkable. The late Lord Spencer had an Arab who was ridden ninety miles one day by Omar Pasha's messenger, carrying the news of the Russian repulse from Silistria to Varna. The horse was none the worse, but the man who rode him died. This horse, Omar Pasha by name, went afterwards to Exmoor to help the ponies.

"So far I have only spoken to you about breeding a hunter, and I do not intend to go into harness or Hackney horses, the breeding of which has long been followed with peculiar success in the Fylde of Lancashire. But I do intend to speak to you about the troop-horse and the relation of horse-breeding to what is called the army demand. What I want to point out is this, so long as the weight-carrying galloping hunter be the type or model, misfits are valuable for most purposes, and especially suitable for troopers or artillery horses. Modern warfare teaches us that the cavalry horse can hardly be too good an animal. It is as necessary now to be assured of the quality of cavalry horses as of their number. If the troop-horse has not actually to gallop and jump like a grass-country hunter, he must be able to stay, and, as dealers say, 'move himself.' As you know, it is only blood and action which carries weight, and the trooper on active

service has to carry a weight which, from a hunting point of view, seems almost restrictive. Nearly every witness the Commission examined pointed out how much an army demand, assuring opportunities of direct sale to army purchasers, may help horse-breeding. What you must remember, however, is not to dock a young horse you mean to show a Government purchaser.

"Another point in connection with the army demand that I should like to say a word upon is Government purchase of three-year-olds. No doubt if the Government could see their way to buying at three years old, or at a higher price than is given at present, it would be a beneficial move to breeders; but we must look at this from a taxpayer's and consumer's point of view as well as from a producer's. The Government supply themselves as cheaply as they are able, and provided they do that, and do not sacrifice efficiency to cheapness, we all here to-night, as taxpayers—for we are all taxpayers, though we may not all be horse-breeders—must not complain. In the matter of prices, too, it must be borne in mind that the middleman who sells a horse to the Government, delivers at his own risk and on a month's trial, conditions which are not contemplated in the case of a horse bought direct from the breeder. So much then for the troop-horse; and I hope I have proved to you that if your misfits make troop-horses, they have satisfied such a high standard that you may be pretty sure that you are breeding on the right lines. Though the price you may get may only be a price which pays expenses, you have at all events established a footing in a practically unlimited market.

"Horse-breeding is not merely a good thing in itself, but a good thing for your neighbours and for your country, and may also be made the profitable and pleasurable complement of all kinds of mixed farming."

An aspect of horse-breeding equally important to that which Lord Ribblesdale has here treated of, was well put before farmers at the Norfolk Chamber of Agriculture by Mr. C. S. Read, namely, breeding for use on the farm, and the necessity which it entails of considering the nature of the land. Mr. Read said:—

"Although the Shire-horse is the most dominant and popular breed elsewhere, he did not think it could be reckoned the best horse for the light lands of Norfolk. The best possible Shire-horse blood which existed in England could be obtained; but it would be impossible on these

light lands to keep up the type in the same manner as the blood and characteristics of the Shire-horse could be maintained in the Fens and Midland Counties. But that was no reason why they should not try to improve the breed of their own stock, and it had been improved in a great measure already. The majority of farmers bred horses for use and for work, and not to sell. If Norfolk farmers bred horses simply and chiefly for their own use, he thought the clean-legged cart-horse would beat the others out of the field."

This extract is from a speech by Mr. Read made after the reading of a paper on the Breeding of Shire Horses, by Mr. Frederick Street, in which the effect of the Shows upon horses and horse-breeding is severely criticised. Mr. Street considers:—

"A stallion ought not to be in show condition at the end of the season. It is detrimental to the constitution and procreative power, and it is seldom that such an animal gets many foals for the first five or six weeks. I hold it to be a suicidal policy to continue the over-feeding during the season for the sake of winning a prize at the summer Shows. Believing the system to be wrong in principle, and a source of loss as well as disappointment to owners of mares, I would suggest that the Royal and other County Societies be requested to discontinue giving prizes to stallions over three years old at the Summer Shows. The giving of prizes for stallions at local Spring Shows I take as a waste of money, and not likely to fulfil the object in view unless there is some guarantee that the members may secure the service of the prize animals. It frequently happens that without this stipulation the owner keeps his horse at home and charges a fee that is prohibitive to ordinary tenant farmers. But it was with pleasure that he observed a yearly increase in the number of societies offering prizes for foals. It encouraged the smaller farmers to use good sires, and gave them an opportunity for the better disposal of their produce. A large number of foals being gathered together, an excellent opportunity was afforded for observers to note the uniformity in character of the progeny of the different sires."

15.—*The Examination of Horses as to Soundness.**

By Professor J. WORTLEY AXE.

THE examination of horses as to soundness demands for its efficient performance a large and varied experience of horses in general, as well as a full share of that higher technical training which scholastic study affords. The responsibility which attaches to the work is daily becoming more and more recognised and insisted upon by those in whose interests we act. The rapid increase in the quality of our horse stock, arising out of improved methods of breeding and a more painstaking system of rearing, has naturally and happily led to an increase in their value, so that the best specimens of our horses have doubled in value in the past twenty years. People are in the habit of saying that "good horses are scarce." If by that they mean that they are less numerous than they were at the time I have referred to, I have no hesitation in affirming the contrary. Good horses of every description were never so plentiful, and at no time was there such a market for them as now. With an increase in value there has very naturally arisen a desire on the part of purchasers to guard themselves against imposition and the many possible disappointments and losses which attach to the purchase of horses. On this account the services of the veterinary surgeon are much more in request than they were formerly, but there is also a decided tendency on the part of dealers to evade the responsibilities of "warranty," and to throw the onus of proof as to the soundness of horses on the veterinary expert. No one can complain of this wholesome departure from a pernicious system of sale, which invested horses and horse-dealing with infamous repute. I take it as a high compliment to the veterinary profession that purchasers now have confidence in the integrity and skill of our craft, and upon our judgment as to soundness, and are content to accept our decision without any guarantee from the vendor. The increase of public confidence and great advance in the price of horses have brought with them a corresponding increase in our responsibilities. Circumstances which have recently occurred in connection with several members of our profession have clearly demonstrated this. All of you are more or less familiar with the fact that serious claims have recently been set up against veterinary surgeons on account of losses sustained by reason, as it has been alleged, of their negligence or want of skill in the examination of horses as to soundness. In two or three instances large sums of money have been recovered, either

* Abstract of a Lecture to Royal Counties Veterinary Medical Association.

by costly action at law, or as the result of adverse arbitration. A deep sense of insecurity in regard to this branch of our duties has in consequence been engendered throughout the profession, and it is with a view to afford an opportunity for an expression of opinion on this subject that I bring the matter before you to-day. No one who has had any experience in the examination of horses as to soundness can have failed to recognise the onerous and trying circumstances under which we are called upon to exercise this branch of our calling. It is not with an inanimate machine, whose every part may be disconnected, scrutinised, and tested, that we have to deal, but a living, complex, ever-changing organism, exposed to and influenced by varying conditions of environment and purpose, and in a too large measure also by the abuses of human vice and folly.

In proceeding to deal with this subject, we must first repeat the question so often asked—What is soundness?

Chief Justice Best, in the case of Best *v.* Osborne, laid it down that "sound" meant "perfect." To this definition I take no exception in the abstract, but if it is the standard to be recognised in dealing with horses, then it will be obvious at once that we can no longer hope to speak with authority on the subject. The vital machinery of the animal organism is hidden away from us, and, save so far as refers to objective physiological signs, cannot be scrutinised. Therefore this definition of soundness imposes upon us a duty and responsibility which we are not warranted in accepting. We cannot reasonably certify to the physical perfection of an animal whose essential parts we have insufficient means of examining. Further, such a definition is exclusive in its application to horses; such a thing as perfection, even in the accessible parts of a horse at the working period of life, is quite phenomenal.

Mr. Baron Parke (Coates *v.* Stephens), who may be regarded as a ruling authority, said that the word "sound" means that the animal is free from disease at the time he is warranted "sound"; but the Baron violates and demolishes his own definition immediately when he admits, as he does, that disease is not inconsistent with soundness, for he says: "If, indeed, the disease were not of a nature to impede the natural usefulness of the animal for the purposes for which he is used . . . it would not amount to an unsoundness."

Here, then, it is admitted that there are certain forms of disease which may be reconciled with the state we term soundness; but the Baron only adduces one, and that is governed by the position which it occupies, and not by the nature and extent of the malady itself, as "if a horse had a pimple on his skin it would not amount to unsoundness; but if

such a thing as a pimple were on some part of the body where it might have the effect of impeding the natural usefulness of the animal, it would constitute unsoundness."

Mr. Baron Alderson agrees substantially with Mr. Baron Parke. He says, "If a horse is purchased to be used in a given way, the word 'sound' means that the animal is useful for that purpose; and unsound means that he at the time is affected with something which will have the effect of impeding that use."

According to these two eminent authorities, the essence of soundness is the capability of an animal to perform (without let or hindrance) such work as it is best fitted to perform by virtue of its size, build, and general character.

This discrepancy in the literal and legal sense of soundness, and the utter unfitness of either to the requirements of a rational and consistent system of horse inspection and certification, needs our serious consideration. Difficulties meet us on the threshold, and continue at every stage to render the duty of examination both onerous and precarious. It will be accepted as a truism that no two horses are alike in their physical proportions, and the same may be said in a large measure with regard to homologous parts of the same animal; and when the question is viewed from an anatomical standpoint, the reason of this latter discrepancy becomes at once apparent, inasmuch as no two bones in the body are exactly alike, and in many instances the difference is considerable and striking. Hence arise those strange anomalies in limbs and joints which lead veterinary surgeons to differ in opinion, as to the presence or absence of disease. One example will suffice to illustrate what I mean. Nothing, perhaps, fills the veterinary surgeon with so much doubt, or involves him in greater difficulty, than the inspection of horses' hocks. This part of the animal presents such variety in its normal conformation, and in some instances such unusual developments of its bony constituents, as to render a differential diagnosis between health and disease a matter of uncertainty, even in the hands of our greatest experts. Rough or coarse hocks, as they are termed, by which we mean joints characterised by great size, and lumpy or irregular surfaces, are frequently the subject of diverse opinion; and the conditions often afford reasonable ground for the differences which arise. It is, in some instances, impossible to answer definitely the question put before us, as to the existence or non-existence of disease; if we would allow this simple admission in cases of doubt to supplant positive assertions, much trouble and no little credit which we now forfeit would be reserved to us. There is a limit to the experience and professional knowledge of

the most able amongst us, and to recognise this is the first duty we owe to our profession and to ourselves.

The presence or absence of lameness is another point about which we, unfortunately, too often disagree, and here, again, the discrepancy does not warrant the burning reflections which are sometimes heaped upon us by the uninformed. Nothing can be more obvious than the want of uniformity in the gait or mode of progression displayed by different horses; while in the majority of instances there is freedom, steadiness, and harmony of movement, this is by no means invariably the case. The strange and erroneous impressions which the various descriptions of normal action leave on the minds of those whose experience has not reached the adjusting stage, *i.e.* who have not yet learnt to appraise the influence of conformation in perfecting or disordering the symmetry of action is remarkable. This same discrepancy unquestionably prevails, though to a less considerable extent, in the higher ranks of our profession, and hence we find one eminent man regarding as lameness that which is assigned by another to a peculiar gait; and in this, as in the anomalies of conformation, it is often difficult, or even impossible, to positively assert who is in the right. Such differences of opinion are sometimes inevitable, as the truth is incapable of proof. In illustration I will refer to one or two conditions affecting action in such a way as to render it misleading. That state of the croup known as "goose rump," when existing in an exaggerated form, imparts to the action the appearance of lameness in one hind limb when the horse goes from you, and in the other as he approaches you. The slight inclination inward of one fore-foot conveys the impression of lameness in the opposite limb. Straight shoulders and upright pasterns, associated as they frequently are with short and stilty action, tend to the belief of lameness of both fore-legs. The hind limbs, set inordinately apart, occasion considerable oscillation of the body, and a sense of lameness is excited as affecting both fore-limbs.

As with the organs of locomotion, so with those of respiration, the physiological phenomena vary in different animals, and in the same animal under different conditions. The breathing sounds emitted during exertion within the limits of health are various, and examples are not rare which appear to occupy the narrow border-land of disease. Here, again, the question of soundness becomes essentially one of opinion, and it would be surprising, if under such delicate circumstances discrepancy did not arise among us. Doubtful cases should be so represented to clients, who are as capable as ourselves of recognising the fact that there is a limit to human knowledge

and human art, while they appreciate a reasonable explanation of a difficult position, and are prepared to allow the same consideration to us as to others whose shortcomings in the practical business of life are not less conspicuous than our own.

Diversity of opinion on individual cases is every now and again the result and natural outcome of the eccentricity of disease. A defect present to-day may soon disappear, or even be absent to-morrow, and what was obvious to one man on a particular occasion may at a later period be non-existent, and consequently unobserved by another.

The apparent inconsistency of conflicting testimony is not always incapable of being reconciled with sound professional judgment and honourable conduct. Sudden and brief lameness, and temporary local manifestations of disease in horses recently certified sound, have led to conflict of opinion, and in not a few instances to costly actions at law. Yet these discrepancies, arising as they do out of altered conditions of the animals themselves, between one examination and another, cannot reflect on the judgment of the members of our profession. Differences arising from such causes might possibly be guarded against to some extent if veterinary surgeons would meet and confer together on the merits of the case, instead of emulating the example of their clients by standing aloof from each other. It is the interest of the lawyer to drag into court conflicting testimony; but it is the gain and duty of veterinary surgeons to protect themselves from what the public construe as exhibitions of professional and moral weakness.

The conditions under which examinations as to soundness are conducted are frequently of the most unfavourable description. In the bustle of fairs, the showyard, and the auction mart there is much to distract attention and to try the capacity and confidence of the most astute of our profession. Still, no considerations of this kind are allowed to weigh against the responsibility involved in the undertaking.

Great as are the difficulties, natural and imposed, with which we have to contend in the examination of horses, when we find differences of opinion expressed upon matters about which disagreement is not reasonably possible, the conclusion is irresistible that something is wrong in the profession itself, for which the profession alone is responsible.

Whatever we do should be creditable alike to our professional and moral character; and if, perchance, we fail in sustaining the former, we should at all risks maintain the integrity of the latter.

To our client we are answerable for the efficient performance of the duty entrusted to us, and the soundness of any advice

which we may venture to give him. Where adverse opinions are given in respect of the soundness of horses recently purchased, the action of the buyer is in a large measure determined by the representations of the veterinary surgeons, and the question of litigation, mutual settlement, or arbitration depends very much upon the manner in which such representations are made. Numbers of cases, which now find their way into our law courts to scandalise our profession and disgust our clients, might be brought to an amicable settlement. A man suffering under the disappointment of possessing a lame horse, whether that lameness arose antecedent or subsequent to purchase, is naturally eager to justify himself in sending him back, and it is no part of the veterinary surgeon's duty to impose any obstacle in the way of such a course, but it is most desirable in the interest of the profession, that any opinion he may express with regard to any ailment should be guarded by reasonable qualifications where such are necessary. It is desirable in order to guard ourselves from unnecessary responsibility to be less certain in our statements as to matters of opinion, to be more open with our clients and our *confrères*, and to desire least of all that our emphatic judgment should be confirmed in a law court at the cost of others. Thoroughness in our work, the adoption of improved methods of inquiry, close observation and careful comparison of individuals, and individual parts, together with the exercise of ingenuity and patience, are the qualities which enable us to eliminate error and embrace the truths on which success depends in this as in all other branches of our pursuit.

16.—*The Fat Globules of Milk.* By Prof. Fredk. D'Hont. [Translation.]

The fat contained in milk is present in the form of small globules floating in suspension in the liquid. These globules were observed by the earliest workers with the microscope, and Leewenhoeck has recorded the impression which their discovery made upon him. Since then most microscopists have studied milk: some pretend to see globules of casein as well as of fat; others globules of fat surrounded with an envelope of casein; while others say the globules are simply fat. The last opinion has been generally accepted since the recent researches of Duclaux.

I purpose to draw attention to the *size* of the fat globules; a subject which has not been properly investigated.

When a drop of milk is examined under the microscope,

a notable difference in the size of the globules is seen; and if several milks are examined, this difference becomes more marked. This has been known in England for some time. On the Continent much importance has not been attached to it. Boussingault, in his work on Agricultural Science, gives drawings under the microscope of milk, before and after churning, skim-milk, and butter-milk. The globules represented are of very variable form, due perhaps to the imperfection of the microscope, or to inaccurate drawing. Boussingault states, without attaching any importance to it, "that butter-milk contains numerous very small globules."

Eug. Tisserand, who was the chief promoter of the improvement in the dairy industry of France, recognised the influence which this difference in the size of the fat globules might have. In a work, already antiquated, he says, in speaking of the separation of fat by the rising of the cream, "The large globules ascending first, pushing aside the small globules, and taking with them a certain amount of caseous matter, which separates after standing for a long time. The medium-sized and small globules also take part in this upward movement." And he proves by micrographical reproductions that when milk is set at a low temperature the large globules are no longer or rarely to be seen in the skim-milk, only very small ones being found.

If, in addition to taking the milk from one herd, the milk of cows of different breeds is examined, the fat globules from cows of the same breed are seen to have a fairly regular size, which differs with each breed.

It is this which causes cattle in England to be classed as butter breeds and cheese breeds.

I have endeavoured to illustrate this fact in the accompanying plates, which represent photographs of the milk of nine cows of different breeds, as seen under the microscope.* The milks examined came from Jersey, Dutch, Brittany, Flemish, Swiss, Durham, and several foreign breeds of cattle. The photographs are not those of exceptional samples. Since 1889, when I commenced this investigation, numerous photographs of milk from these same breeds have been made, and a large number of samples examined, and I have noted that the differences between them are maintained.

This investigation, though still far from complete, is a step in a direction which ought to be followed by those who are interested in dairying.

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* These excellent photo-gravures cannot be reproduced here; and, unfortunately, we have nothing in England which can compare with them.—Assoc. Ed.

One is struck by the great difference in the diameters of the fat globules. At first sight one might divide the different breeds into three classes:—

Breeds with small globules.
Breeds with medium globules.
Breeds with large globules.

Among the breeds with small globules are those of Holland, Flanders, Fémeline, &c. Among the breeds with medium-sized globules are those of Brittany, Switzerland, &c. While among the breeds with large globules are the Jersey and Durham.

The cows of Holland and Fémeline yield a large amount of milk, the first very poor in butter-fat, the second very rich.

The milk of the cows of Cassel, Flanders, Montbéliard, Brittany, and Switzerland, is less abundant; but, owing to its very great richness in fat, it is frequently used for butter-making. Last of all, the milk of the Jersey cow and of the Durham is still less abundant; the milk of the Jersey is particularly rich in fat, and is used almost exclusively for butter making.

If we consider the operations of butter-making and cheese-making, it is evident that the choice of the breed used will be influenced by the size of the fat globules.

In making butter one must agglomerate the various-sized and scattered globules, whether the milk itself or cream be used.

Even in the separation of the cream, whether by allowing it to rise or by a separator, as the two methods are based on the difference in specific gravity of the fat and the milk, the statement of M. Tisserand previously referred to, has considerable importance: milk containing large globules will allow the cream to separate much more rapidly than that containing small globules. The principle is the same, whether the separation be spontaneous, promoted by cold, or mechanical.

When cream or milk is churned, the larger the globules the greater the chance of their impact and gathering together due to the movement of the churn. Churning is then very rapid. This is not the only advantageous result obtained by using milk with large globules, for while separating and also in churning the large globules take up the smaller ones. It is, therefore, advantageous to add to milk containing medium-sized or small globules a certain quantity of milk with large globules, in order to increase the yield of cream and butter.

This is practised in England, where we find in many dairies a few Jersey cows (generally about one to eight) kept to increase the yield of butter, though, doubtless, most makers do not surmise the cause of the increase.

In Belgium several dairy farmers do the same.

The size of the fat globules in the milk of the Jersey is very regular, and though some very large ones are found, one cannot discover any very small.

In the milk of the Durham cow, on the contrary, there is great diversity in the size; some very large globules, others very small. Hence the milk of the Jersey can exert an influence far greater than that of any other breed, and I consider this precious quality an advantage more than compensating for any faults in the breed. This regularity is important, because the addition of some Jersey milk to that of a Durham cow increases immediately the yield of butter.

I have observed that the food has no influence on the size of the globules, for the Jersey and Dutch cows, the milk of which I have photographed, received the same food.

For the manufacture of cheese the fat of the milk must not be allowed to agglomerate, but should remain distributed as equally as possible throughout the milk. This explains the choice of certain breeds, notably that of the Dutch cow, for the manufacture of cheese. It will be well to avoid all milk with large globules for this industry.

I trust that this subject of the size of the fat globules of milk will receive the attention of, and be further investigated by other professors interested in dairying, so that in time it may be possible to classify all the breeds of various countries.

17.—*The Potato Crop in Ireland.*

THE condition of the potato crop is one of so much importance at the present time, that special tables have been compiled by the Registrar-General, with the view of showing the acreage under each principal kind of potato, and the disease-resisting power of each.

In 1880 a special return to Parliament was made as to the acreage under each variety of potato, the yield, and the liability to disease at that time.

Since that period an annual return has been made of the acreage and yield of each variety of potato in Ireland, which has been published with the annual detailed report. On this occasion the usual plan has been departed from, and the information is given in this return.

As already stated, the acreage under potatoes in Ireland in 1890 was 780,801, as compared with 787,234 in the year 1889, showing a decrease of 6433 acres.

The acreage under each variety of potato, with the percentage to the total, is shown in the following statement:—

	Acres.	Per cent.
Champions	613,700	78·6
Flounders	59,500	7·6
Skerry Blues	26,867	3·4
White Rocks	16,238	2·1
Magnum Bonums	14,331	1·8
Kemps	8,524	1·1
Scotch Downs	7,620	1·0
Cruffles	2,805	4·4
Brown Rocks	2,416	
American Roses	2,363	
Leather Coats	801	
American Whites	463	
Red Rocks	432	
Green Tops	169	
All others	24,572	

The main feature observable in the foregoing statement is that 78·6 per cent. of the acreage for the potato crop in Ireland consists of Champions, leaving only 21·4 per cent. for all other varieties, the percentage of some of these being so small as to be barely appreciable when put into figures.

The Champion potato was first introduced in quantity into Ireland in the year 1880, after the failure of the potato crop in 1879. Since that year the Champion has constituted the main crop of the country; and from a table which is given showing, for the years 1880–90, the total area under potatoes, and the extent under Champions, with the annual rate of produce of that variety, it appears that the proportion of Champions planted in Ireland has practically been the same for many years past, while the yield per acre has considerably diminished, pointing to the deterioration of this variety.

Reference to a table where the acreage under potatoes is set out for each variety by counties, provinces, and for the whole of Ireland, shows that in Ulster a greater number of varieties are planted than in any of the other three provinces, and that especially in the counties of Antrim, Down, Donegal, Londonderry, and Tyrone there is less tendency to rely on Champions than in the other counties of Ireland. In Antrim, for instance, Champions constitute little more than one-half of the crop, while in the counties of Mayo, Galway, &c., all but a very small part of the crop planted this year consisted of Champions.

The disease-resisting power of the different varieties of potato is given in a table, in which the districts are classified for each variety of potato under the following heads:—

1. Where the proportion sound is under 50 per cent.

2. Where the proportion sound is over 50 and under 75 per cent.

3. Where the proportion sound is 75 per cent. or upwards.

With the view of showing the comparative disease-resisting power of the different varieties, the results set out in that table have been rearranged under three degrees of freedom from disease, with the following results :—

75 PER CENT. AND UPWARDS SOUND.

		Per cent. of the Districts in which grown.
1. Magnum Bonums	in	66·7
2. Leather Coats	„	50·0
3. Skerry Blues	„	36·4
4. Brown Rocks	„	33·3
5. American Roses	„	28·5
6. Flounders	„	27·8
7. Kemps	„	22·4
8. Scotch Downs	„	21·7
9. White Rocks	„	21·0
10. Cruffles	„	14·3
11. Champions	„	12·8

50 AND UNDER 75 PER CENT. SOUND.

1. Green Tops	in	100·0
2. Cruffles	„	85·7
3. Champions	„	67·0
4. Brown Rocks	„	66·7
5. Scotch Downs	„	62·6
6. Flounders	„	61·0
7. Red Rocks	„	60·0
8. White Rocks	„	58·0
9. American Roses	„	57·2
10. Kemps	„	52·6
11. Skerry Blues	„	51·1
12. Leather Coats	„	50·0
13. Magnum Bonums	„	27·8

UNDER 50 PER CENT. SOUND.

1. Red Rocks	in	40·0
2. Kemps	„	25·0
3. White Rocks	„	21·0
4. Champions	„	20·2
5. Scotch Downs	„	15·7
6. American Roses	„	14·3
7. Skerry Blues	„	12·5
8. Flounders	„	11·2
9. Magnum Bonums	„	5·5

"It would seem from these statements," the Registrar-General writes, "that too much reliance has been placed on the Champion potato. When reporting on the subject in the detailed annual report for 1881 I mentioned that 'it is a matter for practical agriculturists to seriously consider whether it is advisable for

the Irish farmers to run the risk of having such a large stake in one variety of potato.' I understand that there is an impression among some experienced agriculturists that the Champion potato is losing the productive and disease-resisting power which it possessed in such a marked degree ten years ago."—*Farmer's Gazette.*

18.—*Animal Nomenclature.*

SOME recent disputes have brought up the question of the proper nomenclature of animals in regard to their ages and conditions. One instance has caused more than usual interest, and the decision of a Court before which the case was brought for trial, that a cow is a female of the bovine species of animals, as is the definition of the word given in Webster's Dictionary, has raised general objection. A Court in England decided that a lamb became a sheep when it had acquired its first permanent pair of teeth, which is at the age of about one year. The decision has settled the law on this point, reasonably and upon rational and scientific grounds.

But, as regards other subjects of dispute and other animals, there seems to be no rule at all, but every man is at liberty to use his own pleasure in regard to the distinctions between animals of various ages. This leaves many opportunities for disputes, which may become serious and involve considerable pecuniary interests at times, and stockmen and judges of live-stock should certainly have this matter settled authoritatively.

In practice, the distinction between young and old as regards animals consists mainly, if not wholly, in the condition of the teeth, and an animal is young until all the permanent teeth have been acquired, when it becomes mature and full grown, and it is considered old when its natural functions begin to weaken, and the effects of age are shown by the deterioration and wear of its teeth, and its productive ability begins to fail.

As regards a cow, the definition given by Webster is certainly faulty; otherwise, a new-born calf would be a cow; and as the terms calf, heifer, and cow are all applied to the same animal at different stages of its life, it is of interest to know when one of these stages passes into the other. There is no question about a calf. Universal custom has fixed this term to mean a young bovine animal which has not shed its first or milk teeth. This change begins to take place at the age of about a year to rourteen months, when the female calf becomes a heifer. It femains a heifer until either it completes its permanent dentition, which is at the age of four years, or until it bears a calf

and yields milk, which is, in the opinion of some breeders, the time when a heifer becomes a cow. Webster's definition of a cow as a female of the bovine species would authorise an exhibitor to offer a six-months-old calf for entrance in the class of cows, which would be an absurdity. An English decision a few years ago was to the effect that a cow could not be properly entered in this class unless she had borne a calf, and as a cow is an animal specially used for producing calves or for yielding milk, it might well seem to be a reasonable judgment.

In regard to horses, there is less uncertainty in nomenclature. A colt or a filly becomes a horse or a mare when the permanent teeth are completed, which is at the age of four years.

This subject is of sufficient importance to be settled by authority, and, as the business of judging animals is one that can only be performed satisfactorily by experts employed for the purpose, the various breeders' associations might find it advantageous to have this point of nomenclature settled as a basis of action for the judges, and to avoid the frequent disputes which arise from unsatisfactory awards at the exhibitions.—*Bell's Weekly Messenger.*

19.—*The Manufacture of Oilcake.*

THE history of oil-milling, were it carefully and completely written, would cover the greater part, if not the whole, of three centuries. The records of the Patent Office contain abridgments of specifications of patents dating as far back as 1617, and it may be fairly assumed that even this was not the birthtime of what is now a large and flourishing industry.

Oil-milling, or as it is more generally known, seed-crushing, consists in the extraction of vegetable oils from vegetable products by means of hydraulic or other pressure; and in this way many substances are made to yield oil, and it is by far their most valuable constituent. Among the seeds so treated are linseed (flax), rape-seed, cotton-seed, hemp-seed, teel-seed, croton-seed, castor-seed, mustard-seed, palm-nut-kernels, and copra, which latter is the fruit of the cocoanut-palm dried either by natural or artificial means, the former being preferred by the British manufacturer.

About forty years ago, and for many seasons, large quantities of rape-cake found their way to Ireland, where the demand for this cake was at that time more general and on a much more extensive scale than at present. But as in times of revolution, so sometimes in periods of evolution, changes come rapidly, and although the crushing of rape-seed is not a lost art, for it is

still carried on in several ports on the East coast of England, it has entirely given place in the West to the crushing of linseed and cotton-seed, for the products of which the demand is still on the increase.

Linseed-cake is the best known and most largely used of all the artificial feeding-stuffs. Pure cake should be made from good linseed, sound in condition, and thoroughly well screened from impurities. Linseed is now grown in many parts of the world, and the area of cultivation is constantly widening. Time was when America drew all its supplies from abroad, but in recent years the United States have produced almost enough for their own wants, and at one period it looked as if they were on the point of becoming an exporting country. South America also now grows considerable quantities of linseed, and the exports from Chili and the River Plate are actually an appreciable item of supply. Formerly our main dependence in this country was on the Russian crop of seed, but the production of India has increased so enormously that the greater proportion of the total import into Great Britain is now obtained from that country.

Much of the seed contains, as imported, a considerable admixture of various foreign substances, the lower sorts of East Indian, in particular, containing a large proportion of non-oleaginous seeds and dirt. Before pure cake can be made from such seed it must be subjected to a process of careful screening, whereby the deleterious substances are separated from it.

The impurities are of all sizes, from the ordinary bean down to the finest dust, and varying in weight and substance from common pebbles to the lightest chaff. When cleaned, the seed is passed between iron rollers which crack it and partly bruise it. It is then ground under heavy edge-running stones, or passed between several other pairs of rollers, and, after being heated by steam and placed in bags, has the oil expressed from it by powerful hydraulic presses. In these presses the cakes are formed. The cakes, when taken out, and after their edges have been neatly pared, are dried and become ready for delivery to the consumers.

From this brief description of the process of making linseed-cake, it is very evident that great attention must be paid to the quality of the seed, and still more to its careful screening, moreover, that the percentage of oil left in the cake is largely dependent upon the amount of pressure to which the crushed and ground seed is subjected.

Cotton-seed may be crushed either in the decorticated or the undecorticated state; that is to say—seed from which the shell has or has not been removed. The crushing of decorticated seed is an industry almost entirely confined to the United

States, where it has reached gigantic proportions, and from whence large quantities of the cake are imported into this country.

For the manufacture of undecorticated cake preference is given by makers of high class cakes to Egyptian seed, as being freest from cotton fibre, but it is desirable to adopt special machinery to neutralise the effect of even the small quantity of wool adhering to the Egyptian seed. However much more costly it may be to buy cake so made, there is, particularly where valuable cattle are fed, a real economy in getting rid of the risk incurred by the use of a feeding-stuff containing a large admixture of coarse cotton-wool, which cannot but be indigestible and dangerous.

The decortication of cotton-seed is in the main an American industry, chiefly for the reason that the process is much easier when the seed is fresh grown.—*Farmers' Gazette.*

20.—*Food of Domestic Animals.* By Dr. Hector George. [Translation.]

The quality of the meat furnished by domestic animals depends to a great extent, not only on the breed, but also upon the food they consume. Meat, milk, and eggs, from animals of the same breed, show for this reason very great variations in quality.

Every one knows the difference there is between the meat of oxen fed on grass, and of those fattened on brewery or distillery refuse. The savoury taste of the one, and the insipid taste of the other, amply justifies the difference in the value of the animals when sold for meat.

Even pastures themselves have very different qualities. Some are justly renowned for a superiority which others cannot attain. If the pasture contains a bitter substance (such as wormwood), or one with a strong smell (such as garlic), the flesh of the animal will have the taste or the smell of these plants in proportion to the quantity consumed.

The bye-products of various industries also produce marked effects. The residues from distilleries or beet-sugar works make the meat deficient in taste; certain oil-cakes (such as colza, flax, and hemp-seed cakes) give the meat too much taste; mainly a disagreeable oily flavour. If these residues have a very marked smell, it is transmitted to the meat; such is the case with the "bœufs anisés," animals fed with the residue from a manufactory near Albi, where a liqueur is made from aniseed.

It is the same with milk. Normandy cows are justly re-

nowned for the quality of their milk, and of the butter it affords. Yet these same animals, if the country and food be changed, give very bad results. M. Sanson, of the College of Grignon, quotes some examples. Cows fed on the beet pulp from sugar-works give milk and butter of inferior quality. Milk is similarly impregnated with a disagreeable taste by some oil-cakes; it takes the flavour of the cabbage on which the cows are fed. It retains the flavour of other foods. With aromatic plants it becomes perfumed; with garlic, onions, and other bulbous plants, it receives their odour; the leaves of wormwood, chestnuts, artichokes, and horse-chestnuts, make it bitter; and hyssop causes it to become purgative.

It is upon such observations that the production of medicinal milk is founded, when such is required for children.

That which is true of oxen is equally true of sheep. Sheep fattened on marshy meadows make insipid meat, which differs very much from the savoury meat of sheep fed on salt meadows near the sea-coast. Here again the same breed varies in value according to its nourishment. Sheep from Poitiers, for example, whose flesh is very inferior, acquire near the sea (as M. Sanson justly remarks) all the qualities of "salt marsh" sheep.

Pigs are not an exception to the general rule. Old pupils at the College of Alfort can remember the abominable taste of the flesh of some pigs which were fed upon the waste from the dissecting-room. On the other hand, all breeders know that Indian corn imparts to the flesh of pigs a highly esteemed flavour.

The Chinese have a race of domestic dogs which they value very highly, but they feed them on porridge and vegetable food, which makes their flesh very palatable. Twenty years ago, during the siege of Paris, dogs were eaten to a large extent, and those who ate them formed very different opinions on their gastronomic merits, some considering them detestable, others excellent. There was good reason for this difference. The former had eaten dogs from the streets, fed on scraps and filth; the others had eaten dogs from their houses, fed according to the Chinese method. The difference of food created in the flesh a marked difference in taste. As a further instance we may compare wild rabbits with domestic rabbits:—"Tasting still of the cabbage on which they were fed."

We find the same variations in the flesh of domestic birds. Chickens and turkeys often find in farmyards linseed, of which they are very fond, but this nourishment imparts to their flesh a disagreeable taste, which detracts considerably from their merit when eaten.

There is a food of which fowls are very fond, namely,

May-bugs (cockchafers). A meal of these in the spring is for them a treat. But the farmer's wife knows that the flesh and eggs of her fowls would announce both by smell and taste a diet of cockchafers.

Aquatic birds which feed almost exclusively on fish keep the taste of fish in their flesh in a deplorable way.

Fish themselves have very different tastes, according to whether they live in muddy water or in water running over a stony bottom. If a stream receives water containing empyreumatic (partly burnt) products from a manufactory, the flesh of the fish becomes, to its detriment, like that of smoked fish.

These examples suffice to teach the importance which should be attached to the quality of the food of domestic animals destined for consumption by man.

The teachings of chemistry do not alone suffice to guide us in the production of meat, milk, and eggs. Observation and experience must equally aid us to improve the quality of those animal products which are destined for the food of man.—*Journal d'Agriculture Pratique.*

21.—*The Pulse.*

An enquiry often addressed to a veterinary surgeon is, What should be the number of pulsations in a minute? Though in a state of health we find a given number of beats in a given time, yet accelerated speed affords really very little indication of any departure from health. There are several things that influence the frequency of the pulse even in the healthy animal, such as breed, age, pregnancy, warmth, plethora, rumination, &c. Thus in two horses, a low-bred carting animal, and a thorough-bred, a difference of eight or ten pulsations in a minute may be found.

The same difference may be observed in the ox, due to age, and between an elderly cow and a yearling heifer there may be a difference of ten to twenty beats. Fat animals, and those confined in warm sheds, have a much more rapid pulse than those that are running or are low in flesh.

Suppose the amateur surgeon understands forty-six beats per minute to be the average number in a cow in health, if he examines the animal just as she has suspended rumination, *i.e.*, left off chewing her cud, as most cows will do when approached, he may find her—although perfectly healthy—with a pulse at sixty or seventy per minute. If he did not understand that the

pulse is accelerated during rumination and the temperature increased, he might conclude the animal was very ill.

In a sheep, by the time it is caught the pulse will have so increased in frequency as to form anything but a reliable guide as to its health.

The *character* of the pulse is of far greater importance than the number of beats. The pulse in disease may be full, small, soft, hard, oppressed, unequal, &c.—fine distinctions; yet an appreciation of, at least, the more important characteristics is absolutely necessary to properly understanding the value of the pulse.

It may be useful to deal briefly with the most important.

A *slow* pulse is when the number of beats is below the normal number per minute, and may indicate defective nervous energy, such as would arise in certain brain disorders.

A *weak* pulse may denote feeble heart action, and is expressive of debility.

An *irregular* or *intermittent* pulse indicates heart disease; it is owing to arrest of its action at either regular or irregular intervals.

A *hard* pulse is that of inflammatory fever, as, for example, the hard, jerky pulse of inflammation of the bowels.

An *oppressed* pulse, in which the beat is prolonged, and not very marked, indicates congestion, say, of the lungs; there is obstruction, and the blood is with difficulty forced along.

It will be readily understood that for indications other than number, it is necessary to take the pulse at an artery, the size and degree of contraction of which show the hardness and softness, fulness or smallness. These vessels have sufficient elasticity to enable them to adapt themselves to the volume of the stream. The force with which the blood is propelled from the heart diminishes as the distance from the centre of circulation is increased, so that we select an artery of considerable size, and one as near to the heart as possible. It must be superficial, and so situated that it can be pressed against some hard body, such as a bone. In the horse the sub-maxillary artery is invariably employed. This is situated at the lower jaw, and the method adopted is to stand on the near side of the animal, and to soothe and pat it to allay any fear or excitement, which would infallibly send the number up many beats. Then place the left hand lightly in the nose and find the artery with the fingers of the right, pressing it against the jawbone, so as to ascertain the manner in which the blood flows.

In the cow there are several arteries utilised; the sub-maxillary, as in the horse, the brachial or radial, within and rather to the front of the elbow, and the large metacarpal at the

fetlock. The last can be employed whether the animal is feeding, cudding, or even lying down.

Sheep are rarely "pulsed," but the best place is the artery inside the thigh, pressing it against the thigh-bone.

The fallaciousness of the pulse as an aid to the diagnosis of disease has become proverbial; properly understood it is valuable, especially to the veterinarian whose patients cannot describe their sensations, but it is possible to get very far wrong if the indications are not properly understood. Of no subject is it more true that "a little knowledge is a dangerous thing."—*Mark Lane Express.*

22.—*Extracts from the Agricultural Department Leaflets.* 1890.

II. and XII. Report of United States Secretary of Agriculture.

The estimates of the expenses of the Department of Agriculture under the new *régime* show a considerable increase over those of last year. Deducting the 126,000*l.* appropriated directly to the experiment stations of the country, there is left for the requirements of the Department 271,800*l.*, making the whole expense for the year 397,800*l.*, "an amount" as Mr. Rusk says, "which should not be measured by the past, but rather by what a great agricultural country should pay towards sustaining, protecting, and promoting a calling which lies at the foundation of its prosperity and power."

"The very essence of the duties devolving on this Department of the Government is that its results shall be promptly made available to the public by a comprehensive scheme of publication. Time and expense, ability and experience lavished on the work of the Department can have no practical results unless we can lay their conclusions promptly before the people who need them."

In the Chemical Division there have been important investigations to determine the influence of different kinds of foods upon the composition of butter; the results have proved of the greatest interest, and have shown that the quality and composition of the butter are greatly affected by the character of the foods used.

The attention of the Botanical Division has been directed to forage plants and grasses.

Among many other grasses sown were some from Europe, such as meadow foxtail, perennial rye grass, meadow fescue, trifolium incarnatum, sainfoin, and Hungarian brome grass. Of these it is reported that the perennial rye grass, meadow fescue, sainfoin, and Hungarian brome grass were the most successful and promising at the end of the season.

Mildew and black-rot on vines were successfully treated with the "Bordeaux mixture," consisting of 6 lbs. of sulphate of copper and 4 lbs. of lime to 22 gallons of water. The most beneficial treatment for mildew was simple spraying with sulphate of copper solutions early in the spring, and again with the Bordeaux mixture before the flowers opened.

Apple scab, which is troublesome in the United States, sometimes disfiguring the fruit of an entire crop, was stayed in a degree by spraying the fruit with solutions of carbonate of copper and ammonia.

The distribution of seeds to Experiment Stations and Agricultural Colleges has been carried on as usual, and will be sedulously adhered to.

"The vast extent of this country," Mr. Rusk observes, "with its great varieties of soil and climate, justifies the belief that there is no cereal grown abroad which cannot be equally well grown, and indeed improved, in some sections of this country."

It is well known how well equipped is the Entomological Division of the United States Agricultural Department, and what valuable work it has accomplished under the skilful guiding of Professor Riley. To give one instance: Orange cultivation in California was disastrously affected by the Fluted Scale, or Cottony Cushion Scale. It was discovered after careful investigation that this Fluted Scale, *Icerya Purchasi*, was a native of Australia, but did little damage there, as it was kept in check by a species of the *Coccinellid*, a "lady-bird" known as *Vedolia cardinalis*. Agents were accordingly sent to Australia to obtain consignments of these predatory insects, which, on being liberated in the orange orchards, increased so rapidly and proved so active against the Fluted Scale, that several important orchards have already been completely freed from this pest, and despondency has given way to hope and confidence among Californian orange-growers.

In Florida, where orange production is becoming a most important industry, a tiny spider, or mite, makes the leaves fall from the trees by sucking the sap and juices from them. This mite belongs to the order and family to which also belong the "Red Spider," *Tetranychus telarius*, which does great harm in hop gardens in England; other species injure damson trees; while yet another species of Red Spider has made the leaves of gooseberry and currant trees drop off.

It has been found that spraying, or syringing, the infested trees with washes of kerosine oil and whale soap have proved effectual. "Kerosine emulsions" and sulphur have also been beneficial in Florida.

Washes of soft soap and quassia have done good service in fruit plantations and hop gardens in England in routing red spiders.

Stamping out pleuro-pneumonia has been successfully prosecuted by the Veterinary Division, or, as it is styled, The Bureau of Animal Industry.

The Dairying interest is to be confided to a new and special branch of the Bureau of Animal Industry, with a view of improving the manufacture of butter and cheese, and of maintaining absolute purity, as well as consulting the tastes and requirements of foreign consumers.

There are five millions of farms in the United States, upon which there are nearly ten millions of farmers and labourers, "representing thirty millions of people, or nearly one-half of the present population of the country."

4. On some Enemies to Crops in Queensland.

The fruit-growers in Queensland are subject to great losses and crop failures from the attacks of insects.

A report by Mr. Tryon, Assistant Curator of the Queensland Museum, has been published as a parliamentary paper with the title: "Inquiry into Diseases

affecting the Fruit Trees and other Economic Plants in the Toowamba District."

In the introductory part of this report Mr. Tryon says, "Whatever attempts are individually made by cultivators to protect their crops from the attacks of insects or fungus pests, these efforts on their part will be rendered partly inefficacious, or even altogether futile, by the indifference shown in these matters by their neighbours."

As an instance, it is said to be quite a common occurrence to see trees whose grub-infested fruit is allowed to fall to the ground and remain there. This neglect is especially reprehensible when it occurs early in the season, for it is mainly owing to the absence of measures for destruction of fruit damaged by the maggots then, that fruit, whose season for ripening is later on, suffers; whereas, even if pigs were allowed to consume this infested fruit as it fell to the ground much good would result.

Many British fruit-producers take no steps to destroy the apples which fall from the trees containing the larvæ of the codlin moth, nor think it necessary to pick up and bury the plums and damsons infested with larvæ of the plum weevil, and of the moths of the *Carpocapsidæ*.

Just as the seeds of some weeds are distributed by the wind throughout wide districts, some insects and fungi are carried by the same agency from place to place, as well as by various other means of dissemination. It is, therefore, essential that cultivators should take every precaution against the spread of insects and fungi, as they do to check the growth of weeds.

Formerly the "American blight," caused by the Woolly Aphis, *Schizoneura lanigera*, was a terrible scourge of the apple-growers in the district. As many as two hundred apple trees died on one farm from its attacks. But it has been overcome to a considerable extent by planting blight-proof kinds, which have been principally imported from America.

The majority of Queensland growers now confine their attention to these blight-proof varieties of apples.

It is difficult to understand how one kind of apple tree or an apple tree raised by grafting a particular stock is less liable to the attacks of this aphis.

It has not been noticed in Great Britain that certain kinds of apple trees are more free from aphis blight or other insect or fungus attack than other kinds, and the real cause of the freedom may be the selection of more suitable soils and aspect, and better systems of management, together with modes of precaution and remedies adopted against the enemy.

7. State Agricultural Laboratories in Belgium.

From the report for 1888 of the Administrative Commission upon the position and work of the State Agricultural Experiment Station, at Gembloux, and the seven agricultural laboratories established in different parts of Belgium, it is seen that there has been a large increase in the operations of these laboratories, and that they are much appreciated by the Belgium cultivators.

The following figures show the number of articles received for examination and analysis at the various stations since 1884, viz.:—in 1884, 3477; in 1885, 6220; in 1886, 8312; in 1887, 9713; in 1888, 11,047.

The nature of the articles received in 1888 and 1887 is shown in the following table:—

—	1888.	1887.
Manures	8,231	6,631
Soils and subsoils	45	40
Foods for man	646	547
Feeding stuff..	251	291
Seeds	50	76
Sugar Beet	1,647	1,719
Various articles	177	409
	11,047	9,713

Besides the analyses afforded by these agricultural laboratories, cultivators and others wishing for information receive written or verbal advice upon agricultural subjects. Thus at Hasselt 108 applications were made by letter, independently of numerous personal consultations with applicants. At Mons 105 letters were sent in answer to requests for information upon various matters, and numerous personal consultations were afforded, which it is said by the director render much service to agriculture.

A curious case of six cows being killed by poisoning, from having been fed during the winter upon a cheap corn-meal known as "krok," is reported by the director of the laboratory at Anvers. Much doubt was felt at first as to the cause of the death of these animals. The meal was carefully analysed and examined microscopically, and was found to contain 68·68 per cent. of the seed of the weed *Agrostemma githago* (corn cockle). From experiments made by leading Belgian veterinarians upon animals, it has been proved that the weed *Agrostemma* or *Lychnis githago*, corn cockle, is most poisonous, and there appears to be no doubt that the large quantity of the seed of this weed present in this meal, "krok," was the cause of death of the six cows in question.

Mysterious deaths among farm animals frequently happen in our own country, and it will be well in future to examine foods for the presence of this dangerous and common seed, when all other determinations have proved negative.

9. Caterpillars on Fruit Trees.

Upon examination (in the spring) of the leaf buds and blossom buds of fruit trees, especially of apple trees, tiny greyish caterpillars will be seen at work eating the leaves while they are still unfolded, or slowly unfolding.

The caterpillars are so small as to escape notice unless the attention is specially directed to them, but they can be found in alarming numbers in many orchards and fruit plantations, and it is most important that steps should be taken at once to check their progress.

Syringing the trees infested with caterpillars proved advantageous in many places, particularly in respect of plum, damson, and small apple trees. Large old apple trees were beyond the reach of ordinary machines used for this purpose.

The mixtures employed for syringing fruit trees are—

1st. The extract of quassia, obtained by boiling 10 lbs. quassia in water, added to 100 gallons of water and 7 lbs. of soft soap.

2nd. The extract of 5 lbs. of quassia in 100 gallons of water, with 6 lbs. of soft soap and 4 pints of paraffin, well stirred.

3rd. The extract of 5 lbs. of quassia to 100 gallons of water, with 6 lbs. of soft soap and 4 pints of Calvert's carbolic acid, No. 5.

4th. 8 lbs. of soft soap, 2 lbs. of finely-ground hellebore, and a quart of paraffin, well stirred together. This is sufficient for 100 gallons of water.

The soft soap is dissolved in a tub with hot water. The quassia chips are boiled in water and put into another tub. Where paraffin is used it should be well stirred up with hot soap and water before it is mixed with the cold water. Water-carts, ordinary barrels, or wine casks set upon frames with wheels, are brought full of water to where the materials are being prepared, either at the farm buildings or in an extemporised shed with a copper in it, and the requisite amount of dissolved soap and other ingredients is added. The cart is then driven to the scene of action, the materials being kept well mixed by the jolting.

Syringing to be effective must be commenced early. Directly there are signs of infestation the process should be begun. As the hatching out of caterpillars is not simultaneous, but is extended over some days, the syringings must be renewed.

Fruit-growers in several parts of the country are now for the first time trying the arsenical insecticides used extensively in the United States and Canada. These have not been hitherto adopted in this country on account of their poisonous properties.

There are two substances of this nature. The one, "Paris Green," or "Emerald Green," is strongly recommended by several American and Canadian entomologists. Professor Lintner, the Entomologist of the State of New York, says that the produce of fruit-land may be doubled by the judicious use of this substance.

Care must be taken to observe strictly the regulations laid down for its use, or injury will be caused to the foliage and blossoms.

The latest advice from experienced practical entomologists is to put 1 lb. of the Paris Green into from 165 to 200 gallons of water. The mixture must be kept well stirred in order that the solution may be maintained at a uniform strength.

Paris Green solutions must be sent in the form of spray, or mist, upon the leaves, and not squirted violently against them. The object is not to dislodge the caterpillars, but to poison them with the arsenical solution, which should fall like gentle rain upon the leaves. For this purpose fine "rose" jets should be used.

The other arsenical compound, "London Purple," is as poisonous as Paris Green. It is highly recommended by Professor Riley, the well-known Entomologist of the United States Department of Agriculture, who reported in 1885 that it "has an advantage over Paris Green in cheapness, better diffusibility and visibility upon the foliage, while experience showed that the Paris Green injured the foliage more than the London Purple."

One pound of London Purple should be mixed with from 140 to 150 gallons of water, and kept well stirred, being applied in the same manner as the Paris Green—sprayed on in the form of a heavy dew, or mist.

Stock must not be put on grass in orchards where these arsenical solutions

have been used on the fruit trees, until a considerable period has elapsed and rains have fallen, nor must they be used where vegetables are grown under the trees.

Three or four days will elapse before the effect of these solutions is apparent. As a rule, it will be found necessary to repeat the application when the leaves are fully out.

10. Eelworms.

A similarity in certain respects exists between the eelworms which infest clover and other plants in this country, and the eelworm which causes the disorder known as the "Root Knot Disease" in America. The following information is furnished in a bulletin recently issued by the United States Department of Agriculture :—

The "Root Knot Disease" affects cabbage, turnip, radish, cucumber, melon, and other plants, as well as vines, peach, plum, walnut, willow and other trees. The action of the eelworms makes the roots "become enormously enlarged, and little else than masses of decaying tissue." The plant or tree stops growing, the fruit either becomes distorted or drops prematurely, the leaves change colour and fall off, and the plant or tree dies so rapidly "as to justify the usual expression, 'struck by lightning.'"

Great mischief occurs frequently in nurseries of young fruit trees, whose leaves are spotted or yellow, and finally drop off prematurely. The tree dies, and upon examination the roots are found to be knotty, decayed, and without rootlets or fibres. Enormous destruction is said to take place in young peach, fig, willow, walnut and plum trees.

Vines, mulberry, and orange trees are injured when old by the eelworms forming circular knob-like knots on the sides of the larger roots, and occasional enlargements at the junction of the smaller roots.

It has been found that a light sandy soil offers the least resistance to the progress of the eelworms. Loose soils mixed with decaying vegetation and humus are also favourable to them, and this is why the worst results are noticed in long-cultivated, fully-fertilised, and thoroughly-pulverised areas.

With respect to remedies for the attacks of this eelworm, many experiments were made upon plants in pots in which infested soil had been put, with tobacco powder alone, and mixed with sulphate of potash, muriate of potash, sulphate of iron, lime, sulphur, hyposulphite of soda, ashes, and bisulphate of carbon.

The best results were given by sulphate of potash, muriate of potash, lime and ashes. Tobacco with potash was also satisfactory.

It is interesting to note that in the experiments upon clover infested with eelworms made by Mr. Willis, of Harpenden, sulphate of potash applications were "decidedly the most effectual remedy, and the clover in this plot made considerably the most growth, and not a blank was to be seen."

Only one insect enemy of this American eelworm has been observed. This is a small blackish-brown ant, that inhabits rotten wood and decaying roots, the *Solenopsis xyloni*, which, "when the infested plants begin to decay, burrows into the tissues and drags out the anguillulæ for destruction."

13. The Hessian Fly. *Cecidomyia destructor.*—Say.

It has been ascertained from examination of the habits and life history of this insect in Great Britain that the female fly comes from the pupa case, or puparium,

in the autumn, and deposits eggs upon the young wheat plants in the creases of the leaves. From these, in a few days, legless larvæ come, and make their way to the bases of the sheaths just above the crown of the root. The larvæ live on the juices of the stems, making the plants yellow and weak. In time they assume the pupal state in the puparia, from which flies emerge in the early spring, and lay eggs on the leaves of wheat and barley plants. The larvæ coming from these fasten upon the second and third joints, and cause the stems to shrivel and fall.

It is believed that the larval state at this time lasts about twenty-eight days, and then the puparium form is assumed.

The puparia are of a brown colour, not unlike the colour of a ripe horse chestnut, and somewhat like linseed, and may be found now in the joints of wheat and barley plants in infested fields.

Methods of Prevention.—Wheat and barley stubble in infested localities should, as far as practicable, be ploughed at once after harvest, and skim-coulters used to bury the stubble completely. Upon "seeds," the stubble should be rolled or beaten down, horse-raked, carried away and burnt. In infested districts wheat should be sown as late as possible, in order that the autumn brood of flies may not find plants to lay their eggs upon. Self-sown, or "Volunteer," corn plants should be cut off in, or near to, infested fields, that eggs may not be deposited upon them. Where wheat and barley crops are infested, after these have been threshed out, whether this is done in the fields at harvest time, or in the stack yards, or barns, later on, all the screenings and short refuse from the screens, and particularly the fine screenings, should be burnt at once. Tail wheat should be carefully examined, and run down again if the chestnut-coloured puparia are found in it. It would be advisable not to sow winter barley and rye near infested fields.

15. Moths on Fruit Trees.—*The Winter Moth.*

In the beginning of October the Winter Moth and the Mottled Umber Moth will come from the chrysalis state in the ground under and near the fruit trees that were infested in the spring, and the female moths will crawl up the trees for the purpose of laying their eggs upon the twigs and branches.

It is most important that the passage of these moths up the trees should be prevented. This can be effected by putting sticky compositions round the stems to entrap the moths; or apparatus of wood or tin, or other material, such as stout varnished cardboard, to bar their progress, as they are quite unable to fly, having only rudimentary wings.

Or a tin or wooden frame, or guard, such as is extensively employed in the United States and Canada against the cankerworm, might be fixed permanently around the stem of the trees. This consists of a girdle of tin, with a wide rim turned up all round inside. It is fastened to strong linen or sacking, and fixed by a cord, to which the linen or sacking is sewn.

The guard is covered upon the inside with grease, or tar, or offensive material, and effectively prevents the moths from ascending the trees.

Some fruit-growers put compositions round their trees.

These measures must be adopted early in October, and the compositions must be kept in working order as long as moths are seen about.

Tar has been found to injure young trees by causing their bark to contract. It should therefore not be used, except, perhaps, for old trees with thick layers of bark, and in this case it should be largely mixed with grease.

Some manufactured compositions have also been found injurious to the trees. Great care should be taken in the selection and application of all compositions whose ingredients are unknown.

Cart grease made from fats or oils, and without tar, is recommended by practical fruit-growers as the best and safest substance. This may be applied directly to the stems, or put upon wide bands of tough grease-proof paper like that used by grocers, fastened round the trees with string, or bass, or rushes, like those for tying hop bines.

As constant greasing may injure trees, especially young trees, it would be most desirable to adopt the system of spreading the grease upon paper bands. When these are employed for old trees their rough bark should be slightly scraped away, in order that the paper may be fastened closely round the stems.

The chrysalids, from which the moths will come in October, are previously in the ground near the trees, and, probably, immediately under their boughs. Many chrysalids might be destroyed by digging or hoeing, or by digging in or hoeing in lime. Upon grass land the grass should be cut off and removed, or fed off closely. After this the surface might be raked with large iron garden rakes. This would expose the chrysalids, many of which could be smashed if the ground after the raking were beaten down with shovels.

23.—*The Agricultural Returns of Great Britain*, 1890. Abstract of Major Craigie's Report.

The Returns.

The annual Agricultural Returns of the Acreage and Live Stock of Great Britain have been, as in former years, based on information supplied by the ready co-operation of the vast majority of farmers. The totals rest on upwards of half a million independent observations.

The percentage of cases in which the occupiers of land have failed to furnish the collectors with information is now, and has long been, far too small to affect in any way the statistical value of the general results obtained; but it is, nevertheless, particularly gratifying to find a still further reduction in the present year in the number of occupiers failing to fill up the schedules placed in their hands by the Officers of Inland Revenue.

The failures from all causes to return the schedules are now confined to 3 per cent. of the whole number issued, and for scarcely more than 4 per cent. of the entire acreage accounted for has it been necessary to resort to estimates.

Several collectors report that farmers formerly averse to furnish information have this year shown themselves more ready to help since the request for assistance was preferred by a Board of Agriculture.

The total number of Returns from occupiers of land, on which the figures now submitted for Great Britain are based, is 577,841. This is the largest total yet reported, and compares with 574,840 Returns in 1889, 570,206 in 1888, and 563,119 in 1887. These totals suggest a slight increase in the number of persons occupying land. The collectors attribute their augmented returns to an extension of the process of subdivision of holdings which has been going on in recent years.

Land occupied by Owners or Tenants.

There is a very slight decrease of the entire percentage of land this year in the hands of owners (14·78 against 14·82) compared with the figures for 1889. The general decrease of owner-farmed land which distinguishes the country as a whole, appears to be relatively more marked in Scotland than in England, while in the Welsh counties generally an opposite tendency appears, and there is rather more land on the owners' hands than there was before.

Land omitted from Annual Record.

All land attached to houses merely as garden ground, or recognised by the collectors to be held as allotments, and any mountain, hill, heath, waste, or rough grazing land, and woods and plantations are not annually enumerated in these Returns.

Land under Cultivation.

The area accounted for in Great Britain in the present tables as under crops, bare fallow, and grass is 32,768,000 acres. This is an increase of 35,000 acres over the corresponding area in 1889. Although comparatively insignificant on the present occasion, this increase of so-called cultivated area has been an annual feature of these Returns, and one which has occasioned considerable inquiry. The cultivated surface reported on in 1890 is altogether 666,000 acres greater than that returned in 1880, and 2,361,000 acres greater than that of 1870. These changes are in part real, and in part apparent only, but their significance ought not to be overlooked when comparisons are made of the proportion of the cultivated area occupied by particular crops at different dates.

A scrutiny of the reports furnished by the various collectors, in the present as well as in previous years, makes it certain that a real and material extension of the margin of cultivation, by the reclamation and fencing in of land previously more or less completely waste, has been in progress without intermission in certain parts of the kingdom, even throughout the period of agricultural depression.

Arable and Pasture Area.

In the present year the Arable area is returned as occupying 16,751,000 acres, or 51·1 per cent. of the whole, the permanent pasture covering the remaining 16,017,000 acres.

A material and nearly continuous shrinkage of the land under the plough has now been in progress for the last 18 years, accompanied by a continuous and still larger extension of the recorded Grass area, but the Arable area is still the greater of the two, if Great Britain be regarded as a whole. This is not quite the case if the English figures be viewed by themselves, as will be seen by comparing the figures for 1870, 1880 and 1890:—

Years.	England (only).		Total for Great Britain.	
	Arable.	Pasture.	Arable.	Pasture.
	Acres.	Acres.	Acres.	Acres.
1870	13,729,000	9,680,000	18,335,000	12,073,000
1880	13,134,000	11,462,000	17,675,000	14,427,000
1890	12,172,000	12,836,000	16,751,000	16,017,000

The 4,000,000 acres added in 20 years to the Pasture of Great Britain, is thus not wholly due to the laying down of Arable Land to Grass. Compared with 1889, the Arable Land of Great Britain in 1890 is less by 117,000 acres, and the Pasture greater by 152,000 acres, nearly the whole change taking place in England.

Crops in Arable Division.

Breaking up into its main sections the 16¾ million acres of the Arable division of Great Britain, the present position and the changes in the total of each group between 1870, 1880, and 1890 may be shown as under:—

Years.	Corn Crops.	Green Crops.	Clover and Grasses under Rotation.	Other Crops.	Bare Fallow.
	Acres.	Acres.	Acres.	Acres.	Acres.
1870	9,548,000	3,587,000	4,505,000	85,000	611,000
1880	8,876,000	3,477,000	4,434,000	76,000	813,000
1890	8,033,000	3,298,000	4,809,000	103,000*	508,000

* Including 46,000 acres of Small Fruit not previously distinguished.

The proportion of Corn Crops to *Arable* Land declined from 52 per cent. in 1870 to 50 per cent. in 1880, and to 48 per cent. in 1890. Green Crops have continued to cover nearly one-fifth of the Arable area in each year of the three. The proportion per cent. of Clover and Grasses under Rotation has exhibited, as has been repeatedly noted, a material increase.

The 8,033,000 acres now returned under Corn Crops is a full million of acres below the average Corn-cropped area of the five years ending with 1880.

Wheat in Great Britain.

Of the area under Wheat a further diminution has to be reported, the 2,449,000 acres in Great Britain under Wheat in 1889 having dropped to 2,386,000 acres in the current year. The decrease occurs in England only, a very slight increase being shown in Wales, and one of 4½ per cent. in Scotland.

Decline in Wheat Growing.

In view of the interest always attaching to the long and nearly continuous decline in Wheat growing, a new Table enables the varying rate of the decrease in the several counties of Great Britain during the past ten years to be traced. Comparing the present year's total, 2,386,000, with that of the mean for the five years ending with 1880, the decline is almost exactly 650,000 acres. If the comparison be made with a still earlier group of five years, 1871–75—a period anterior to the recent depression—the loss is 1,140,000 acres, or nearly one acre in every three. This decline in Wheat growing has been long in progress. If the Wheat area of the three years, 1870, 1880 and 1890 be compared, it will be seen that the absolute decline on the first decade actually exceeded that which has taken place since, for 591,000 were lost between 1870 and 1880 against 523,000 acres since that year. The decline is no doubt attributable to the fall in

the price of wheat, which is now not much more than half what it was in the years immediately following 1870.

The greatest relative reduction of the Wheat area must be remarked in those Western or Northern Counties where the soils or the climate are less suitable to the crop.

Barley in Great Britain.

The area under Barley in Great Britain in 1890 is 2,111,000 acres. This is a decrease of 10,000 acres from last year's figures. The decline is visible only in Scotland and in Wales, the English area being practically as before. The present surface under Barley in Great Britain is greater by some 26,000 acres than in 1888 or 1887, but it is less than prevailed before these years.

Oats in Great Britain.

Oats now cover 2,903,000 acres for Great Britain. The growing of Oats has distinctly extended in England, and notably in the Eastern Counties. In Scotland and in Wales, especially in the latter, the Oat area has been reduced.

Green Crops.

Green Crops were returned as grown in Great Britain this year on 3,298,000 acres, a figure which is only fractionally less than in 1889, though materially below the total shown in 1888 and all earlier years, throughout which a level of nearly 3½ million acres was maintained.

The Potato Crop.

The only noticeable decline in this section of the year's acreage is in the Potato Crop, whereof 50,000 fewer acres have been grown.

Turnips.

More Turnips were apparently grown than in 1889 or 1888, but the total of this root in Great Britain remains below the average of 2,000,000 acres customary before 1887. The present year's return shows 1,948,000 acres.

Green Crops.

Details are this year given of the Green Crops. Of the 314,000 acres thus grouped, nearly three-fourths, or 233,000 acres, carry Vetches, while 18,000 acres under Lucerne are reported.

Sugar Beet.

Only 34 acres appear to have been grown in 1890. In 1871 a total area of 1884 acres was returned as under Sugar Beet.

Bare Fallow.

The area left under Bare Fallow at the date of the collection of the Returns, 508,000 acres, shows a small decrease on the figures of 1889. Twice only, in 1887 and 1888, had the area thus returned been smaller. The general reduction of Fallow, apparent this year in the large majority of counties, is broken by some striking changes in the opposite direction, as in Norfolk, Suffolk and Essex.

Hop Acreage.

The decline in the area under Hops in Great Britain was carried further in 1890. The surface employed for Hop growing is now returned at 54,555 acres only, the lowest point recorded since these returns were first collected.

Small Fruit.

An increasing area, more than sufficient to balance the decline in Hops, is again reported as under Small Fruit, embracing Strawberries, Gooseberries, Currants, &c., under this title. The surface returned as occupied in this way is 46,200 acres, or an increase of 4300 acres. The practice of Fruit growing is certainly extending both in England and Scotland.

Orchards and Market Gardens.

The area under Orchards once more also shows an increase, the total for Great Britain now standing at 202,300 acres, a larger surface than has yet been recorded. This is also the case with Market Gardens, which have increased to 73,300 acres.

Clover and Grass.

Clover and Rotation Grasses show a small decline in acreage from the relatively high figure returned in 1889, the present area for Great Britain being 4,809,000 acres against 4,877,000 acres last year. Both totals are, however, higher than any recorded before this date, a result doubtless of the practice, in many districts, of prolonging the time under which artificial grasses are retained on the soil.

Reduced Area devoted to Hay.

A large and material decline in the proportion of the Rotation Grasses kept for hay is reported this year, 184,500 fewer acres being so kept out of a total in itself reduced. If to this reduction there be added the 208,800 fewer acres of Permanent Grass set aside for Hay this year, Hay must have been cut on nearly 400,000 fewer acres than in the immediately preceding season. This, which is one of the most prominent features of the returns now submitted, is almost everywhere ascribed by the Collectors to the large and unexhausted crop of 1889 and the low values it commanded.

Live Stock.

The record of Live Stock in Great Britain in 1890 is the most satisfactory presented for many years.

Horses.

The total number of Horses kept solely for Agriculture, 981,000, shows indeed very little difference from previous years. There is apparent a small increase in England, with a decrease in Wales and Scotland. In Unbroken Horses an increase, bringing up the total in Great Britain to 394,000, calls for no special remark.

Breeding Mares.

Mares kept solely for breeding have not been previously distinguished as a class by themselves. They have now been extracted separately from the data annually supplied by occupiers of land, with the result that a very distinct increase, amounting to 10 per cent. as compared with 1889, and 15 per cent. on 1883, is apparent, the total now returned being 57,430, the increase extending to nearly every county in England. The Collectors in various districts report a prevailing local impression that the action of the Royal Commission on Horse Breeding has resulted in a material development of a profitable branch of business, which has not received till lately the consideration it deserved.

Cattle.

No more encouraging feature is presented by the Returns for 1890 than the large increase shown in the stock of Cattle and Sheep in Great Britain. The number of Cows and Heifers in milk or in calf now returned is 2,538,000, a figure approached, indeed, in 1885, 1886 and 1887, but not met with before or since. The breeding stock now returned is thus greater by over 100,000 head than in 1889.

A decrease of other Cattle over two years old is apparent. Some part of the decrease under this head would seem due to the earlier maturity of the stock sent to the butcher.

Cattle under two years old exhibit a very remarkable and general increase in the present year, amounting to 279,000 head, and bringing up the total to 2,532,000. Compared with the average number returned in the decade ending 1880, the present figures exhibit an increase of over 400,000 head.

Sheep.

A very important increase is also exhibited in the number of Sheep and Lambs. The number of Sheep of one year old and upwards is returned as 16,757,000, or 894,000 more than in 1889, only one or two counties failing to join in the general advance.

In Lambs the increase is relatively greater still, a total of 10,516,000 head being enumerated, and the increase over 1889 being 746,000, or 7·6 per cent. The present stock of Lambs is now greater than in any year of the past decade, or than the average of the decade ending with 1880. The increasing proportion of Lambs to the total flock in recent years appears to confirm the general impression that Sheep are now being matured more rapidly, and passed into consumption as mutton at an earlier age.

The total Sheep Stock of Great Britain, 27,272,000 is now greater than in any year since 1879, a recovery of nearly 3,000,000 head being apparent since the losses of the period 1879–82 left us with only 24,320,000 sheep in the last of these years. Two-thirds of this addition to our flocks, or an increase of 2,000,000, has occurred in the last two seasons.

Pigs.

There is also to be noted on this occasion a large increase, frequently attributed to the cheapness of potatoes, in the Pigs enumerated in these Returns, bringing the total for 1890 up to 2,774,000, a number never before reached.

Live Stock in 1870, 1880 and 1890.

It is interesting to contrast the numbers of the Live Stock returned in 1870 and 1880 with those of the present year. In all descriptions but sheep we have an important increase in the number of Live Stock compared with the position twenty years ago, the figures being as under:—

Years.	Horses.	Cattle.	Sheep.	Pigs.
	No.	No.	No.	No.
1870	1,267,000	5,403,000	28,398,000	2,171,000
1880	1,421,000	5,912,000	26,619,000	2,001,000
1890	1,433,000	6,509,000	27,272,000	2,774,000

It must be, however, noted that the increase in Horses is almost wholly in the class of Unbroken Horses and Mares kept solely for breeding.

In Cattle it is mainly in Cows and in young stock that the development has occurred, and the increase of 1,100,000 in twenty years in our horned stock is a matter for congratulation. The more recent increase of Sheep has not yet compensated for the earlier decline, but it is to be remembered that the greater number of Lambs now apparent is believed to indicate a larger annual out-turn of meat from a smaller standing flock, due to earlier maturity.

General Summaries.

Grazing and Corn Counties of England.

Before passing from the figures for Great Britain to the summary which is given of the Agricultural Statistics of the United Kingdom, it may be here appropriate to reproduce, with the data for 1890, the customary Table on page 310, which has for many years appeared in these Reports, indicating the relative course of agricultural and distinctive differences between the twenty-one Counties of the West regarded mainly as Grazing, and the twenty-one Eastern or Corn Counties of England.

The extent to which the two groups of Counties thus distinguished differ from the mean of England as a whole in the area devoted to different kinds of crops may be shown by the Table on p. 311,—exhibiting the particulars in Grazing Counties, in Corn Counties, and in all the Counties of England, with the percentage of the Total Cultivated Acreage under each head in the year 1890.

Ireland.

Irish Statistics.

The principal changes recorded are in the same general direction as those just noticed for Great Britain, with the exception of a small increase in Wheat. The Irish Wheat area, which was given as 66,222 acres in 1887, now stands at 93,208 acres. In Live Stock, Ireland, like Great Britain, shows a satisfactory increase, returning in 1890 more Horses and a largely increased number of Horned Cattle, Sheep, and Pigs.

ACREAGE under CROPS, and NUMBER of LIVE STOCK, in GRAZING COUNTIES and in CORN COUNTIES of ENGLAND, and PERCENTAGES of the TOTALS for ENGLAND, in GRAZING and CORN COUNTIES respectively, in the year 1890.

	In Grazing Counties.		In Corn Counties.	
	Acreage and Number.	Percentage of Total for England.	Acreage and Number.	Percentage of Total for England.
	Acres.	Per cent.	Acres.	Per cent.
Total Acreage returned under all kinds of Crops, Fallow, and Grass	13,444,485	53·8	11,563,662	46·2
Total Acreage of Permanent Pasture .. For Hay ..	2,517,414	60·9	1,613,863	39·1
Total Acreage of Permanent Pasture .. Not for Hay	5,863,939	67·4	2,840,984	32·6
Total Acreage of Arable Land ..	5,063,132	41·6	7,108,815	58·4
Acreage under—				
Wheat	717,229	31·8	1,538,465	68·2
Barley and Bere	576,871	32·5	1,198,735	67·5
Oats	884,035	53·6	764,118	46·4
Rye	18,826	41·7	26,341	58·3
Beans	79,655	23·4	260,800	76·6
Peas	42,868	19·8	173,551	80·2
Total under above Corn Crops	2,319,484	36·9	3,962,010	63·1
Potatoes	191,238	54·9	156,978	45·1
Turnips and Swedes	628,518	45·1	764,190	54·9
Mangold	91,564	28·4	231,243	71·6
Carrots	2,800	20·8	10,635	79·2
Cabbage, Kohl-Rabi, and Rape	58,767	39·9	88,608	60·1
Other Green Crops	82,918	27·8	215,117	72·2
Clover and other Grass under rotation .. .. .. For Hay ..	826,050	49·0	858,729	51·0
Clover and other Grass under rotation .. .. .. Not for Hay	682,006	61·7	424,033	38·3
Total under above Green Crops and Grass under rotation ..	2,563,861	48·3	2,749,533	51·7
Flax	1,273	52·7	1,141	47·3
Hops	9,701	17·8	44,854	82·2
Small Fruit	11,852	28·8	29,237	71·2
Bare Fallow..	156,961	32·8	322,040	67·2
Orchards and Market Gardens ..	165,170	62·6	98,888	37·4
Nursery Grounds..	4,655	41·5	6,568	58·5
Woods, &c.	786,892	51·8	731,429	48·2
Number of—	No.	Per cent.	No.	Per cent.
Horses used solely for Agriculture	373,964	48·9	390,894	51·1
Ditto, Unbroken	164,778	55·9	130,033	44·1
Mares kept solely for breeding..	23,812	59·7	16,076	40·3
Cattle	3,015,412	65·3	1,602,229	34·7
Sheep	9,350,926	55·5	7,490,362	44·5
Pigs	1,220,891	51·8	1,134,869	48·2

Description of Crops.	In Grazing Counties.		In Corn Counties.		In all Counties.	
	Acreage.	Per cent.	Acreage.	Per cent.	Acreage.	Per cent.
	Acres.	Per cent.	Acres.	Per cent.	Acres.	Per cent.
rn Crops	2,319,484	17·2	3,962,010	34·3	6,281,494	25·1
een Crops	1,055,805	7·9	1,466,771	12·7	2,522,576	10·1
›ver and other Grass ınder Rotation ..	1,508,056	11·2	1,282,762	11·1	2,790,818	11·2
ax	1,273	0·0	1,141	0·0	2,414	0·0
ps	9,701	0·1	44,854	0·4	54,555	0·2
ıall Fruit	11,852	0·1	29,237	0·2	41,089	0·2
re Fallow	156,961	1·2	322,040	2·8	479,001	1·9
tal of Arable Land ..	5,063,132	37·7	7,108,815	61·5	12,171,947	48·7
tal of Permanent Pasture	8,381,353	62·3	4,454,847	38·5	12,836,200	51·3
Total	13,444,485	100·0	11,563,662	100·0	25,008,147	100·0

The Grazing or Western Division includes the following counties, viz.:—Chester, Cornwall, Cumberland, Derby, Devon, Dorset, Durham, Gloucester, Hereford, Lancaster, Leicester, Monmouth, Northumberland, Salop, Somerset, Stafford, Westmorland, Wilts, Worcester, York (North Riding) and York (West Riding).

The Corn or Eastern Division includes:—Bedford, Berks, Bucks, Cambridge, Essex, Hants, Hertford, Huntingdon, Kent, Lincoln, Middlesex, Norfolk, Northampton, Nottingham, Oxford, Rutland, Suffolk, Surrey, Sussex, Warwick and York (East Riding).

Summary for the United Kingdom.

Combining into one statement the Irish statistics and the data supplied for the Isle of Man and the Channel Islands, with the figures already reported for England, Wales, and Scotland, the leading agricultural changes between 1889 and 1890 in the entire United Kingdom may be summed up in the Table on page 312.

Imports.

Wheat.

It is interesting and instructive to observe the branches of our Foreign Supply which have most largely augmented. Of Foreign Wheat in Grain, the average yearly gross import per head, in 1861–65, was 106 lbs. But while the head rate rose over each of the four five-yearly periods up to 1881-85 (the highest annual recorded import being 204 lbs. per head in 1882), the mean Wheat import of the years 1886–89 has only reached 165 lbs. per head. Against this, however, must be put the augmented head-rate of Imports of Flour. These have risen from 21 lbs. per head in 1861–65, to 28 lbs. per head in 1876–80, and to 48 lbs. per head in 1886–89.

Potatoes.

A very remarkable difference is visible in the Imports of Potatoes. In 1861–65 only some 3 lbs. per head of our population were received from abroad, whereas the average import of the five years, 1876–80, was as high as 28 lbs. per head, while this sunk in 1886–89 to an average supply of 7 lbs.

Acreage.	1890.	1889.	1890 compared with 1889.	
			Increase.	Decrease.
	Acres.	Acres.	Acres.	Acres.
Total Cultivated Area	48,045,755	47,931,165	114,590	..
Total of Permanent Pasture ..	27,115,425	26,816,092	299,333	..
Total of Arable Land	20,930,330	21,115,073	..	184,743
Corn Crops	9,574,249	9,637,354	..	63,105
Green Crops	4,534,145	4,541,760	..	7,615
Clover, &c., under Rotation ..	6,097,210	6,188,502	..	91,292
Flax	99,326	116,192	..	16,866
Hops	54,555	57,749	..	3,194
Small Fruit	*46,733	*42,506	4,227	..
Bare Fallow	524,112	531,010	..	6,898
Live Stock.	No.	No.	No.	No.
Horses	1,964,911	1,945,386	19,525	..
Cattle	10,789,858	10,272,765	517,093	..
Sheep	31,667,195	29,484,774	2,182,421	..
Pigs	4,362,040	3,905,865	456,175	..

* Ireland not included.

Dead Meat.

The most striking development of all our Imports of Produce is visible in the case of Dead Meat. The import per head of Bacon and Hams was six times greater in 1876–80 than in 1866–70, but has not increased since.

The trade in imported Fresh Beef, Mutton, and Pork, which even up to the end of 1875 did not furnish more than a single pound per annum to each average family of five persons, has furnished 29½ lbs. for each such family in the period 1886–89, and in the single year 1889 reached 40 lbs. a year to every such family in the United Kingdom.

Dairy Produce.

The Import of Cheese, which up to 1875 showed some signs of increase, has not perceptibly advanced per head of the population. The rate of 5·6 lbs. per head imported in that year was only just maintained during the last four years. The import of the year 1889 was 5·7 lbs. In Butter and Margarine the supply per head has doubled in the past 20 years—a head-rate of 4·3 lbs. in 1866–70 having steadily augmented to 8·4 lbs. in 1886–89, last year's total, 9·4 lbs., being the largest yet reached. Foreign Eggs are now three times as numerous as in 1861–65, and more than twice as plentiful as in 1866–1870, when 14 were brought to our shores annually for each person, against 30 per head in each of the last two years.

Cattle and Beef.

The year 1889 has seen the largest import of Live Cattle ever before recorded in these Tables: over 555,000 head having been received. Of this total 68 per

cent., or 379,012 came from the United States and Canada. It is remarkable also as an indication of the increased meat consumption of the country that this large importation has been accompanied by much larger supplies of fresh beef than in any previous year, 1,386,000 cwts., or the equivalent of nearly a quarter of a million bullocks, having been imported in 1889. The movement of Cattle into Great Britain from Ireland is greater than our entire foreign importation; but no material increase appears in this trade in the past decade, the number received being 670,000 head in 1889.

Sheep and Mutton.

The number of Foreign Sheep landed in 1889 in the United Kingdom was 678,000. This is a diminution of 278,000 as compared with 1888, which has been, however, much more than compensated by the large importations of Fresh Mutton. These amounted to 1,225,000 cwts. in 1889, and represent an addition of 237,000 cwts. over 1888, or the equivalent of 470,000 more carcases of Mutton than were available for food in the preceding year.

Horses Imported and Exported.

The renewed interest attaching to the question of Horse Breeding lends importance to the details of the Horses imported into and exported from the United Kingdom, as Stallions, Mares, and Geldings respectively. The Imports of Foreign Horses, which in the preceding 10 years had averaged 11,400 in number annually, increased to over 13,800 in 1889. The Exports of Horses to Foreign Countries and British Possessions, in each of the last two years, have materially increased, upwards of 13,400 and 14,800 having been exported in 1888 and 1889 respectively, as against an average of less than 6500 in the preceding 10 years. It is noteworthy also, that while the average value per head of Horses imported in 1889 was 20*l*., the average annual value per head of home-bred horses exported in 1889 was 69*l*.

Foreign Statistics.

Crops in various Countries.

In contrast with the average yield of 29·9 bushels per acre in the case of Wheat in this country in 1889, the production of Germany is given as 18 bushels; of Canada, so far as returned, as 14 bushels; of the United States, as 12·5; of Australasia, as under 11 bushels; and of India, as 9·4 bushels only. The average yield in France was 15·8 bushels in 1888, the last year for which returns are supplied.

Live Stock in various Countries.

It may be worth noting that the United States of America with 52,800,000 head of Cattle, Russia with 24,600,000, Germany with 15,800,000, and France with 13,400,000 appear to be the only countries wherein the totals exceed those of the herds of the United Kingdom. In Sheep our Australasian Colonies, with flocks amounting to upwards of 101,000,000, take the first place among the countries accounted for; Russia, with 44,500,000 Sheep, and the United States

with 44,300,000 at the date of the latest returns, are the only other countries appearing in this Table where larger flocks than our own are reported.

Indian Crop.

A new Table has been this year added, furnishing the latest official statistics of the area and produce of the Wheat Crop of India, both for the year 1889-90, and for the average of the five preceding seasons. The leading features of this statement indicate a Wheat Crop more than 13 per cent. below the average of the five preceding years, or 6,304,000 tons on an area of 24,983,000 acres, contrasting with 6,362,000 tons on 25,912,000 acres in 1888-89.

Short Notes.

Dishorning Cattle.

The solution of the question as to whether it is cruel to perform any operation of a painful nature upon animals must be based upon the necessity for the operation. The infliction of unnecessary pain is cruelty, and therefore if a person performs an unnecessary operation which entails suffering he is guilty of cruelty. As to what operations are necessary, and what are cruel, because not needed, we will not venture to discuss. There are operations which must be performed on healthy animals—putting aside altogether those for the cure, prevention of, or relief from disease or deformity—though even in the performance of these there may be cruelty if they are unskilfully or barbarously conducted.

Operations which render animals more useful to man, or without which they perhaps could not be safely utilised by him—castration of the horse, for instance—cannot be regarded as cruel, though humanity requires that they be performed with skill, and as little pain as possible; but those undertaken with the object of *improving nature*, and which may be more fitly termed mutilations, designed to gratify a depraved taste or stupid fashion—such as "cropping" dogs' ears and tails, "dubbing" fowls, and "docking" all riding-horses' tails—should be classed as cruel, and therefore a violation of the law. Not only do they occasion pain, and often immediate grave results, but they cause serious inconvenience and discomfort to the animals afterwards—as, for instance, the torture docked horses experience from flies.

Dishorning is painful, even when the operation is performed by a skilful operator; but when it is done by a clumsy amateur with imperfect instruments, then of course the pain becomes increased, and amounts to torture. Not only is there the immediate pain of sawing through the sensitive structures which form the core of the horn, but the after-effects lead to suffering, and sometimes a serious termination is observed.

If it be conceded that the operation is necessary in the interest of cattle-dealers, and also in that of the animals themselves—a matter which is disputed—it must be admitted that it should be conducted skilfully and properly, so as to entail as little suffering as possible; and to secure this most desirable object, surely an anæsthetic might be employed. In fact, the operation is one that should be undertaken by a veterinary surgeon.

It is a question, however, whether the operation—granting that it is necessary—does not amount to cruelty when performed after a certain age. In early life (at two or three months old) the rudimentary horns can be completely extirpated (as shown and described in Fleming's "Text-Book of Operative Veterinary Surgery," Part I. pp. 255, 256) with no danger and very little pain. This is the time when operative procedure ought to be resorted to, and it should be considered a legal offence to subject cattle to the torture of amputation of the horns when, through carelessness or apathy, these organs have been allowed to become

fully developed. If oxen must be bred with horns, which are a source of inconvenience and danger in adult life, then these appendages should be removed at a suitable time, when such removal is very easy, and entails but little suffering and no danger to the animal. Such a course should commend itself to cattle-breeders as far more humane and business-like than the practice which now prevails.—*Dr. G. Fleming.*

An American on Agricultural Education.

The question as to whether agriculture should form a branch of study in our public schools, may be considered in a large measure settled—the majority of those farmers who have thought of and spoken on the subject have said, yes, the Government, by authorising a text-book,* has taken the first step in acceding to their wish. My own opinion is to say, at least, that it would be as useful to have a knowledge of the common things around us—plants, soils, stones, birds, insects, minerals, &c.—as some of the history and geography now taught. Agriculture might be taught as a branch of what might be termed "knowledge of common things," including the elementary ideas of those branches of science bearing particularly on agriculture, horticulture and arboriculture. If this were done, and care exercised so that the teaching did not degenerate into a dull and lifeless routine of book-work, it might be made, in the hands of a clever teacher, not only useful but exceedingly interesting—and would do much to fit the pupils to study such subjects intelligently when they came to take them up systematically afterwards—and those who took no higher course than a public school one, could not fail to be the better for such instruction, and would be much better fitted to make observant and broad-minded farmers.—*J. I. Hobson.*

Prevention of Smut in Cereals.

Elaborate and thorough experiments, conducted at numerous experimental stations, confirm the faith that has been placed in Jensen's treatment of grains for the prevention of smut. At the Kansas Station fifty-one different methods were tried, and of these the most effective method was found to be Jensen's hot water treatment. In this process the seed is put into loose baskets, through which water may readily strain, and these are first dipped into water heated up to 110° to 120° Fahr., so that when they are dipped into the scalding water soon after, at a temperature of 132° to 135° Fahr., the temperature of the latter will not be very much reduced. When dipped, the seed should be thoroughly stirred, so that the water may reach every grain. It is only necessary to immerse the seed in the first vessel for about one minute, as that is sufficient time for the seed to become warmed if stirred. It should then be immediately plunged into the second bath and well shaken and stirred about. Immediately after removal from this, plunge it into a vessel of cold water and then spread the grain out to dry. Stress is laid upon the importance of maintaining the proper temperature (132° Fahr.) of the water for the second immersion, so that it may never rise above 135° Fahr. or fall below 130° Fahr. It is stated that the grain may be immersed in the scalding water for fifteen minutes without injuring it. The above is the method pursued in treating oats, wheat and rye. In the case of

* See Library, p. 367.

barley, Prof. Jensen asserts that it must be previously soaked in cold water eight hours, otherwise the smut is not prevented.

Flax Cultivation.

The cultivation of flax in Ireland is confined mainly to the Province of Ulster, the quantity grown in other provinces being comparatively small. In 1888 the; acreage in the provinces was as follows: Ulster, 112,690 acres; Leinster, 546 Connaught, 263; Munster, 114 acres.

The acknowledged prosperity of the farmers of Ulster, as compared with those of the rest of Ireland, undoubtedly has connection with flax cultivation. In addition to the agricultural classes there are others which are benefited by the cultivation of this crop.

The value of the crop in the different provinces, as estimated by the Registrar-General, was for 1888: Ulster, 1,307,478*l.*; Leinster, 6686*l.*; Connaught, 2726*l.*; Munster, 1390*l.* Ulster, with an area in crop cultivation of 1,760,140 acres, had, in 1888, 112,690 acres of flax, being about 1 in 15. The rest of Ireland, with its area of cultivation of 3,380,543 acres, has only 923 acres of flax, being 1 acre to 3660.

The value of the flax crop to the Ulster farmers in 1888, as shown by the Registrar-General's returns, is 1,307,478*l.*

If we compare the money value of the flax crop with that of the oat crop, as stated in the same returns, we find that in 1888 the acreage under oats in Ireland was 1,280,858, the gross value was computed at 7,052,255*l*, being 5*l.* 0*s.* 1*d.* per acre. The area under flax was 113,613 acres, the gross value computed at 1,318,280*l.*, being 11*l.* 12*s.* per acre. Thus the money yield of flax per acre was estimated at almost double that from the oat crop.

I do not desire to encourage unduly the cultivation of flax; my object is to call attention to the great advantages which the cultivation of this crop brings to one of the provinces of Ireland, with the view of obtaining consideration for the extension of its cultivation in other districts to which it is suited. There have been in this country sad failures of business establishments, and much ruin to farmers, through ill-considered attempts to promote flax cultivation and the industries connected with it. The attempts were made in a manner so rash that the unfortunate results which followed them should not have been unexpected. The cultivation and after-management of the flax crop requires an amount of technical knowledge, which at present is almost completely wanting in many districts of Ireland; and, although in some of the districts this crop was formerly cultivated with advantage, at the present time the knowledge necessary for the successful management of the crop is absent.

It is not necessary here to enter into the causes of the decline of flax cultivation in this country; it may, however, be desirable to consider whether its resuscitation should be encouraged. The objection may be raised that as at present carried on in Ireland, the cultivation of the flax crop is not as remunerative as was the case formerly. It is quite true that farmers have not in recent years received as much for their flax crop as they did some time ago; but the same may be said of all other farm produce, and it is probable that if the same progress had been made in the systems of flax cultivation and management as has taken place in other industries, we should find that flax would hold its own in the competition.—*Prof. Carroll.*

Inoculation for Lung Disease.

From a station in Queensland, Australia, I usually send drafts of cattle for sale annually to the colonies of New South Wales and Victoria. These cattle have in rainy seasons to incur great hardships in their long journeys, and are liable to be attacked on the road by lung disease or pleuro-pneumonia, which causes considerable loss. To prevent their being affected by this malady they are usually inoculated with the disease, the virus of which is taken from an animal having it in a mild form. This year it was impossible to obtain the virus, from the disease having disappeared, and the herd of cattle, about 1000 in number, started on the road in good health, without being inoculated; but after travelling a few hundred miles the disease appeared among them, and a yard had to be found in which to have them inoculated, after which the disease gradually disappeared, and those not infected remained healthy, a few of the diseased cattle, not being able to travel, having to be killed or left behind. Cattle which have undergone this process sell afterwards for a higher price per head than those that have not.

It sometimes happens that in the rough work of inoculating wild bush cattle, which is done in a narrow lane, the tail being the part operated upon, that the sharp knife which is used, the point having been first dipped in the virus, slips and pierces the hand of the operator, who is then himself inoculated, but no serious consequences follow, only a slight swelling for a few days, and I have never heard of any fatal results. In the human body its action is mild and benignant, and carefully-conducted experiments need not be attended with much danger to health.

If calf lymph has proved a protection against small-pox, may not the virus of lung disease be an equally potent shield and protection against consumption, with its curative powers in addition?—*Sir Samuel Wilson.*

Dairy Schools.

The more minutely the success of our cheese industry is inquired into, the clearer it will appear that the prestige of our cheese in the British market to-day is the first fruit of the course pursued in imparting instruction to cheesemakers. The different associations were the first instructors; but as soon as it was realised that these did not effectually reach the most backward cheesemakers, the Western Association appointed and sent out instructors to more thoroughly carry on the work. As the outcome of their efforts in the East and West, our cheese has a status in foreign markets that other nations are most strenuously emulating. It is to be remembered that the high position of our cheese is not due to our conditions of soil and climate, but to the influence of the best and most thorough instruction that could be given to the makers. It cannot be doubted but that there is room for further development.—*Canadian Live-Stock Journal.*

Facts.

There are two perfectly different ways of acquiring knowledge; and, in agriculture, the new has not yet superseded the old; but is still struggling to gain a footing, in a field which is, in the main, held by an earlier method. More than half of the most successful farmers and stock-breeders in the country have acquired their skill by a cleverness in reasoning from results, without troubling to enquire into the causes which those results are bound to follow. By natural shrewdness, and a readiness in applying a few very loose general rules—and such

other information as is on the surface—thousands of men have grown good crops, fatted fine animals, and sold both to advantage, without having attempted to become acquainted with the first principles of chemistry, physiology, or finance. Similarly there have been thousands of good cooks who have turned out admirable dinners without knowing even the rudimentary laws of heat. But it is now known to be a fact—and the fact is acted on in most professions, except that of cultivating land—that only a minority ever become proficients by this rough-and-ready method. The majority so taught fail to catch by this superficial process the requisite knowledge, and consequently remain all their lives blunderers and bunglers, to their own loss and to that of every one connected with them. Yet there is a way of being instructed which makes good average scholars of more than 95 per cent. of those who submit themselves to it. This is the method of first ascertaining facts, the relative importance of such facts, and the laws which depend on them; and then, from a knowledge of facts, rising gradually to intelligent practice. This second way is much slower than the first; but it has the great advantage that it is more certain, as well as within the reach of the average student. Statistics which used to be matters of indifference, have become universally in request. There is nothing in which there is more interest taken, at the end of the nineteenth century, than in what may be briefly described as ascertained averages.

The value of the figures used to find out these averages depends upon every one being accurate. One erroneous figure taints a whole record, and makes it useless. If we cannot get our facts right, we cannot distinguish the laws; and, without a knowledge of the laws involved, we had better go back to the old rule-of-thumb method, by which undoubtedly some (a minority) did achieve success and can do so again. Let it be admitted, for it is true, that there have been—and will be again—many successes achieved in agriculture—as in other pursuits—by a happy faculty of assuming which, at least, by practice, becomes a kind of instinct, and leads the gifted practitioner right nine times out of ten.

If Agricultural Shows are to fulfil their function of helping on the new method of acquiring knowledge by weighing and recording weights, their directors must not think any pains too great in order to ensure perfect accuracy in every figure that is given. Errors are possible; and it is our task to-day to seek to impress upon all concerned the necessity that there is for seeing that such possibilities do not ever become actual facts.

No horse-race or regatta is considered complete unless the time is taken by a stop-watch; and the same is true of yachting, cycling, rifle-shooting, &c., every little detail is exactly chronicled. By all these trials, the institutions which enforce them gain in popularity. And it does not appear that indifference to making records is very conducive to success!

In connection with stock-breeding, want of precision in figures is most dangerous. A constant reference to facts and figures is essential to the majority of occupiers of land adopting sound stock-breeding. If thoroughbred sires to become fashionable had not first to win over a race-course, thoroughbred yearlings would not be selling at the rates they now realise. If the Merino Clubs in Germany, America, and Australia had not been in the habit of observing, and recording minutely, the difference of fleeces, Merino rams would not be fetching hundreds of pounds. Nothing but ascertained facts—and facts which rest upon fulfilment of consumers' wants—can long uphold breeds.—*Live-Stock Journal.*

Time taken in Churning.

The relation which should exist between the quantity of cream and the size of the churn is often overlooked, the same churn doing duty in every case, whether 10 lb. or 100 lb. of cream are to be churned. The following tests have been made to show the effect of such practice. The churn used was a rectangular churn of about 15 gallons capacity. The cream was well ripened, and in proper condition for churning, the cream in each test being taken from the same lot. All churnings were started at the same temperature; but as the temperature of the air was several degrees warmer than the cream, the temperature rose considerably before the churnings were completed, it being highest in the samples churned longest. The results in each case are presented in tabular form.

No. of Churning.	Date.	Ounces of Cream Churned.	Temperature.		Time Churning. Minutes.	Ounces Butter.	Per cent.
			Begin.	Ending.			
18	June 13 ..	256	59	62·6	28	40·5	15·82
19	June 13 ..	512	59	63·7	39	78	15·23
20	June 13 ..	768	59	64	62	120	15·62
21	June 13 ..	1,024	59	65·5	85	154	15·04

—*Prof. Babcock, U.S.A.*

Composition of Ewes' Milk. By Dr. Giuseppe Sartori.

In an interesting article on "Cheese made from Ewes' Milk," in the 'Milch-Zeitung' for 17th Dec., 1890, Dr. Sartori gives the analysis of ewes' milk; and his results are of interest, because they represent the average composition of large quantities of milk, and also because the composition of ewes' milk, as given by former investigators, has shown very remarkable fluctuations. Thus Chevalier found only 14 per cent. of total solids; Stohmann as much as 24 per cent.

The results obtained by Dr. Sartori are as follows:—

COMPOSITION OF EWES' MILK.

	1887.		1890.	
	Morning.	Evening.	Morning.	Evening.
Quantity (litres)*	390	405	338	319
Specific gravity	1·037	1·038	1·038	1·038
Water	78·91	78·37	77·27	77·92
Total solids	21·09	21·63	22·73	22·08
Containing Fat	8·90	8·99	10·38	10·04
„ Casein	6·16	6·55	6·28	6·22
„ Milk sugar	5·04	5·05	4·98	4·93
„ Mineral matter	0·99	1·04	1·09	0·89

* About 4½ litres = 1 gallon.

Cheeses made from this milk had the following composition :—

	2	3	5
Water	27·47	29·70	32·90
Fat	30·50	31·30	29·96
*Nitrogenous compounds	35·59	33·69	30·74
Salt	5·39	4·34	4·58
Other mineral matter	1·05	0·97	1·82
	100·00	100·00	100·00
*Containing albuminoids	31·57	28·12	24·63
,, Decomposition products of albuminoids	4·00	5·27	6·08
,, Nuclein	0·183	0·162	0·201
,, Ammonia	0·162	0·169	0·143

The Merits of the Devons. By Ben. R. Eldredge.

I have bred Devon cattle for a long time, sufficient to have become acquainted with their good qualities on the farm and also on the range, and from my experience with them and other cattle, I am prepared to champion the reds with a hearty will. It has been seventeen years since my acquaintance with them began. During that time I have seen them handled with profit for the dairy, and with unexcelled results on the range. Some of the Devon breeders give special attention to milk and butter, and by proper selection attain most gratifying results. Other breeders pay particular attention to beef points, and attain results similar to that reached at the last Fat-Stock Show in Chicago, when the champion on the block was a Devon steer.

Now it is to the Devon as a beef-producer on our Western ranges that I wish particularly to call attention. The Devon always takes the butcher's eye on account of the good loin and high-priced all-round cuts. They kill right for the retailer who has a good city trade, carrying as small a percentage of offal as cattle of any breed. Their quality is as fine as it is possible to produce, as is attested to by the fact that the Christmas roast for the Royal table of England was cut from a Devon. They hold their own on the rockiest mountain range that our country affords, and I have seen them come from grass in good killing condition, when good Shorthorn grade steers of the same age from the same range could only be sold as feeders; and any one who has ever pushed the Devon in the feed-stall knows his worth as a feeder. I grant they are looked upon as smaller cattle than some of our beef breeds.

There are Devons in the New England States that have been bred for generations for dairy purposes. Their beef points have been neglected and sacrificed to development for milk and butter. In-breeding has been resorted to, and there we find a class of cattle excellent in any dairy, but, it is true, rather undersized compared to some of our cattle equally as strongly bred for beef alone. I know this, for I have seen and handled cattle from good New England breeders, and have heard men, who should know better, compare them with Herefords and families celebrated as beef-producers. When the same men are brought around to a good, well-filled Devon, from an English or Canadian herd, where the beef

points have been strongly developed, their argument is fully met and words are useless. A few years ago I was talking about the Devons to a friend who admitted that the Devons excelled our other high-grade stock in quality, but said their size was against them. A short time after that, a bunch of sixty steers, all grass fed, were sold in Salt Lake City. They were a good bunch of steers all around. There were two steers that attracted general attention. One, a good showy Shorthorn grade, the other a low-set, trimly-built, seven-eighths Devon; both three years old. Considerable interest was taken in how the steers would kill. After they were killed the Shorthorn's quarters weighed 760 lbs. The Devon's weighed 740 lbs. This surprised every one, and made a convert of my friend.

In considering the Devon as a range animal it will not do to forget that they breed very regularly. I have never owned a Devon that did not prove a breeder at maturity. This is a very strong point with the breed, and one that the most prejudiced must admit. The prepotency of the "rubies" makes them admired by all who value uniformity in the herd.—*Canadian Live-Stock Journal.*

The Oat Crop.

The oat is usually the first cereal to which the attention of the husbandman is directed as regards seeding. As soon as the severe winter weather changes to a more salubrious state the sowing of the seed will commence in the earlier districts, whilst in the later localities seedtime will probably be deferred till the middle or end of February. The selection of the seed is always an important consideration. Some farmers prefer seed grown in a more northerly climate. Others, again, like a change from the early chalk soils of the south. These for a time carry some of their early ripening properties to the more elevated districts and colder climate of the North. This is clearly exemplified in the peak country of Derbyshire, where the continuous use of home-grown seed tends to retard the ripening of the crop. In Lancashire and Cheshire, where the crop is well and extensively grown, Scotch seed is highly esteemed. Oats grown on the warm, light soils of the Southern counties do not, as a rule, prove very productive the first year, although I think the second year they compare favourably with crops grown from northern seed.

The crop occupies varied positions in the rotation. In the North oats generally follow seeds, either one or two years. A great amount of skill and attention and no little time are wasted in ploughing the seed layers. On the more adhesive class of loams the standard size of furrow is 8 inches wide by 5 inches deep, closely packed, every furrow as straight as a gun-stick; the edge of the furrow forms a sharp angle, leaving a deep interstice between this and the next. When broadcasting was more general than it is now the advantage was more marked. The seed was well covered, and in due time came up in regular rows. Still, the system had its disadvantage, owing to the seedbed immediately under the young plants being hollow—a condition not conducive to the healthy growth of the young plants. The system of broadcast sowing has well-nigh disappeared, at least in the South. Broadcasting to me was never satisfactory, as an extra quantity of seed was necessary, owing partly to some being covered too deep, and another part not covered at all. Under this inequality of depth, the braird was irregular, and consequently never made up its lost ground, hence followed irregularity in ripening.

The usual quantity of seed used per acre is about 4 bushels. With the drill coulters set at 8 or 9 inches apart, the seed must be placed very thickly in the rows, hence overcrowding, a weak puny straw, and a diminutive ear is the result. Instead of this, pass the drill twice over the land, once across, and once lengthwise, and note the result. Under the altered conditions every stem attains a uniform height, and is crowned by a productive head, every corn being fully developed. The difference in the quantity of produce between this system and the ordinary one is very striking. The only additional expense is that of drilling a second time, and in most cases one harrowing may be dispensed with.

On the strong lands of the Midlands, where two or more years' ley are becoming general, oats are taking the place of wheat. Unless the land be pin-fallowed, the uncertainty of a wheat crop after breaking up a two or three years' ley makes a change of system necessary. Another advantage not to be lost sight of is the value of the pasturage on the seed layers from the middle of September till the middle of January. It is a curious fact, and one which at least in these times unfavourably affects the returns on the oolite soils, that the rotation cannot be extended, owing to their unsuitability for the profitable growth of oats. We noticed last year a plough which was considered a great improvement on those in general use. The merit claimed for the invention was that no finishing furrows were left. The most casual observer cannot fail to have noticed the weak stunted produce in the furrows. These are a further source of trouble and annoyance where the reaping-machine is used. We have long obviated both difficulties by one bout of the drill-grubber in each furrow.—*Mr. Gilbert Murray, in Agricultural Gazette.*

The Farmer's Library.

NOTES AND REVIEWS OF NEW BOOKS.

1.—*The Journal of the Royal Agricultural Society of England.* Third Series, Vol. I., Part I.

At the commencement of 1890 the Royal Agricultural Society determined to make two important alterations in their Journal. First, to publish a number quarterly; and second, following the practice of this Journal, to insert Notes, Communications, and Reviews.

In this, the first part, there is no lack of useful information, though some of it may be considered historical, and as having little bearing upon the future of agriculture. Among the papers which make up the Journal much valuable advice is to be found.

"Fifty Years' Progress in British Agriculture," by Sir James Caird, K.C.B., F.R.S., relates to the past, though towards the end the author becomes prophetic, and ventures to foretell the future of English agriculture in the following weighty sentences:—

> "It is a remarkable fact, illustrative of the change of the agricultural system, naturally brought about under the influence of foreign competition, that the home production and value of wheat in England and Wales at the end of fifty years of the existence of the Society, which at the commencement was estimated by Mr. Pusey at 13,500,000 quarters, worth 31,000,000*l.*, will not in 1890 exceed one-half of that quantity and be worth not much more than one-third of it in value. This clearly explains the great fall in the rent of the wheat lands in this country, especially those of the heavier class in the counties on its eastern side. These islands are indeed, becoming every ten years less agricultural and more pastoral. In the last twenty years three million acres, nearly one-seventh of the land under rotation, have been added to the permanent pasture. This change is likely to go on, as only the better class of lands can compete successfully with the products of rich

and unexhausted soils now brought so cheaply to our shores. We have still an advantage over these in the cost of transport, which is nearly equal to the rent here. And, to that extent, British agriculture on the good land should be able to hold its own. But the poor clay soils, which are expensive to cultivate and small in yield, and the poorer soils of every kind, will be gradually laid to grass or be planted for timber. The climate is admirably adapted for grazing. If our manufactures and mines continue to maintain a successful competition with other countries, and if our population, increasing at the rate of one thousand a day, besides contributing largely to our colonies, can find adequate employment at home, there will still be a remunerative market for that description of agricultural produce which can least bear the risk and cost of carriage from distant countries."

"Notes on Agricultural Education at Home and Abroad," by Mr. John Dent Dent, is mainly a *résumé* of the Report of Major Craigie on French Agricultural Schools, and concludes with the following words as the outcome of a review of what is being done abroad for agricultural education:—

"In the Reports on all these countries, allusion is made to the same pressure that we ourselves experience from severe competition. These agriculturists as well as ourselves feel what advantages the virgin soils of the West and the newly-developed wheat-lands of the East possess. Laborious and skilful as the farmers of some of these countries have always been, they know that, if they are to hold their own in the markets of the world, they must endeavour not only to produce a greater amount of grain and meat from the land which they cultivate, but that they must do this by improved processes, and cheaper methods of production. For these reasons they welcome the teaching of science; and when the agriculturists see the marvellous progress which has been made in other industries by the use of brains as well as hands, they also ask that some portion of the endowments of old time, or aid from the general revenues of the State, may be furnished to further develop the teaching of modern discoveries in the most ancient art of the world. I gather from these Reports that British agriculturists must not look to State aid or State teaching as the only, or even as the primary, force in agricultural education. They may, however, expect that in agriculture, as in other branches of knowledge, the State may exercise some superintendence and authority as to

the methods of teaching, and may supply some assistance towards the attainment of a more scientific knowledge of the art which they practise."

"The Early Fattening of Cattle and Sheep," by Mr. H. Evershed, treats of a subject which is becoming daily of more and more importance. Commencing with a short historical survey of past progress, the author shows how that progress has been due to careful selection, and then summarises as follows what it has done:—

> "To mention only a few of the modifications occasioned by selection with a view to utility, it has given sheep their heavy fleeces, and all the meat-making animals their power of forming flesh rapidly; it has given a dairy of twenty-five Shorthorn cows an average of 885 gallons of milk each during their ten or eleven months of yield, and 1,200 gallons apiece for ten selected cows; it has conferred on horses size, strength, endurance, speed; and it has endowed our domestic fowls, since the first hen came to Europe 600 years B.C., with the gift of "everlasting" egg-laying, and with an extraordinary diversity in the colour of the plumage, and in the size and character of the different breeds."

But it is not possible to accomplish these results by every system and with every kind of stock.

> "The practice of early fattening is only suited to animals whose breed and treatment have prepared them for fast feeding. Alternate fattening and starving is always bad management for an animal of any age; and in the case of young animals intended for early fattening, mere sustenance rations for however short a period cannot be attended with profit. The rule of management should be progression, and therefore the calves intended for early fattening should be either bred on the farm or bought when young. It usually pays best to breed at home, unless the farm is well situated for collecting calves from the dairy districts, or in some parts of the country from small farmers and cottagers."

Even then—

> "The safest plan is to breed at home, and, in fact one of the great advantages of early fattening is that the shortened process and the artificial method admit of its adoption in neighbourhoods where breeding was till lately disregarded."

With regard to the influence which the Smithfield Club has had in helping or rather in retarding the objects which are at present considered paramount in the early fattening of stock, the author writes as follows:—

> "When Sir Brandreth Gibbs wrote the history of the Smithfield Club, he remarked that one of the primary objects for which the Society was established was to determine what breeds of animals and methods of feeding yielded most food for man from given quantities of cattle-food. We are not always logical in our methods. The system of feeding for the fat-stock shows has yielded tallow mostly and not food for man, the organisers of the shows having taken no account of the quality of the meat, and having taught nothing as to food rations. Still we have stumbled upon the very useful information that young animals yield—if properly fed—a much larger proportion of lean meat than old ones, and that before either sheep or cattle have reached the period of their earliest maturity they should cease to be eligible for exhibition as fat animals."

The author here refers to the valuable information obtained for and published in the *Live Stock Journal*, giving the weight of the dressed carcases of some of the animals shown at the Smithfield Club Show of 1889.

This paper fully justifies the author's hope that it will "be found sufficient for the general guidance of those who may seek in it for some useful hints derived from practical observation and experience."

May we also suggest that they will find in it ample proof that what is now required is not so much "early fattening" as early maturity?

"The Food of our Agricultural Crops," by Sir J. B. Lawes, Bart., LL.D., F.R.S. This paper is, *par excellence*, the paper of the Journal. It is impossible to condense its contents. The various crops of a rotation are treated in order, and the best summary of the article is that given by the author:—

> "We see therefore that the economy of a rotation of crops is due to the special functions performed by the different crops. We have first the corn crops, which possess the remarkable power of obtaining a supply of food from an ordinary unmanured soil, and also of growing upon the same soil for very long periods. They derive their nitrogen from the soil chiefly in the form of nitrates; and although the crops do not carry off large quantities, they

are indirectly responsible for a great loss of nitrogen, owing to the early period of the year at which they cease to take up nitrates from the soil. The root crops, on the contrary, can obtain very little food from an unmanured soil, and are largely dependent upon a supply in manure, especially of phosphates. But they also take large quantities of nitrogen from the soil chiefly as nitrates; and, owing to their growth taking place in the summer and autumn, more nitrates are formed in the soil and taken up by the crops, and there is less loss than with the corn crops. As cleaning crops, also, the value of roots is very great, especially to the corn crops. The leguminous crops, and especially those which are sown with the corn crops, such as the red and white clovers, are great restorers of fertility, although there is still wanting a clear proof that, under the ordinary conditions of agriculture, these crops obtain their nitrogen from the atmosphere. By sending their roots deep into the subsoil, and covering the land with green vegetation for so long a period, they are able to collect large amounts of food not available to corn crops, the effects of which we find in the increased fertility of our surface soils. With the immense amount and variety of artificial manures at our disposal, and with the knowledge which we now possess regarding the food of our crops, a rotation is no longer an absolute necessity; at the same time, I am disposed to think that the advantage of a rotation in which both root and leguminous crops are grown with more or less frequency in conjunction with corn crops, and which practice has so long adopted, is confirmed by the evidence I have brought forward as being an economical system, suitable for the agriculture of this country."

Of the remaining articles two only need be referred to.

"Observations and Experiments on some English Pastures," by Professor Carruthers, F.R.S., is a further contribution to the so-called "rye-grass controversy." To test the results previously obtained by Dr. Fream, "early in the season of 1889 eight large hurdles were erected in each of the fields (selected for the observations), enclosing about sixteen square yards; and within these four smaller game hurdles were erected, enclosing a plot four yards square." In June and July all the localities were visited and the nature of the herbage in the fields in which the plots were enclosed, and of the enclosed plots, was examined. Professor Carruthers sums up the result of his observations as follows:—

"The composition of these pastures shows the fallacy of seeking in natural pastures the standard for laying down arable land in permanent grass. The adoption of such a standard is to reverse the whole practice and principles of modern farming. The farmer is, so to speak, ever at war with Nature. He is always trying to improve the breeds of his farm-stock and his crop-plants. A reversion to the wild type is a misfortune and a loss. A plant of Nature's sowing on his farm where it should not be, is a weed to be eradicated.

"In laying down land to pasture, as in sowing fields with wheat or any other crop, we must try to surpass Nature. We must bring together the most nutritious perennial plants which will supply palatable food for stock as far as possible all the year round, and we must exclude the weeds and worthless grasses which we have found too abundant in natural pastures. We must also consider the almost universal complaint of the deterioration, if not failure, of new pastures after the third or fourth year, and avoid short-lived grasses. Such pastures have been laid down during the past ten or twelve years by members of the Society in different parts of England and Scotland. These pastures have each year gone on improving; they have everywhere carried more stock than the old pastures on similar neighbouring lands, and their success has been, I believe, mainly due to the exclusion of rye-grass from the mixture of seeds employed in laying them down, and by the selection of what have been proved by experience to be the best permanent grasses and clovers."

"Basic Cinder as a Manure," by Professor Kinch, gives the results of field experiments with this new phosphatic manurial substance, as compared with those obtained with other manures. The author thus summarises his conclusions:—

"On reviewing the whole of the experiments recorded here and elsewhere, it seems proved that the finely-divided slag is an efficient phosphatic manure on all classes of soils, but is more efficacious on heavy clay and on peats, and generally on soils not containing much lime. On calcareous soils it is less certain in its effects, and on these superphosphate will always have a special value. It is a more slowly-acting manure than superphosphate, and should be applied earlier. In cases where a comparatively slowly-acting manure is wanted, it has advantages over superphosphate. Usually, also, it is requisite to apply a larger quantity of the slag than of superphosphate to

produce the same immediate effect, generally about 5 cwt. of slag where otherwise 3 cwt. of superphosphate would be used. At present prices these amounts of the two several manures cost nearly the same. Five or 6 cwt. of slag contains almost double as much phosphoric acid as 3 or 4 cwt. of ordinary superphosphate, and if the effects produced in the first season are the same, the dressing of slag leaves a very much larger residue of phosphoric acid in the soil, which becomes available more or less slowly for succeeding crops. Some experiments seem to show that the slag residues are more effective than superphosphate residues, but more evidence is wanted on this point.

"The powdered slag should never be mixed with ammonium sulphate before use, as it liberates ammonia therefrom, which is thus lost. When both are used to the same crop the slag should be applied first. It is, moreover, undesirable to mix it with kainit; or, if this is done, it should be sown at once, as the mixture is liable to cake and become hard. Owing to the great density of the slag, it is somewhat difficult to apply it evenly; it is, therefore, often advantageous to mix it first with some dry earth or similar material."

The remainder of the Journal is devoted mainly to Reports of work done in the Society's Botanical, Chemical, Entomological, and Veterinary Departments.

2.—*The Journal of the Royal Agricultural Society of England.* Third Series, Vol. I., Part II.

THIS part of the Journal contains seven special articles, the Official Reports of the Society, and some valuable Notes.

"The Development of Agricultural Machinery," by Mr. Dan Pidgeon, Assoc. Inst. C.E., is a most interesting paper, upon a subject the importance of which to agriculture it is difficult to estimate. The author "diffidently" offers some "speculations," from which it appears the work now performed by machinery, if done by horses and men, would cost the country many millions of pounds more per annum. The paper traces the influence of the Society, and of the Show system, upon the "evolution" of agricultural machinery. So long as machinery was judged by the whim or caprice of individuals, which frequently meant by its appearance, little progress was made, and improvement has been mainly due to the accurate trials to

which implements have been subjected, more especially since the introduction of the dynamometer. The effect of the trials —in other words of estimating value by work done—has in no instance been more remarkable than on the steam-engine. At the same time, we venture to think this result due quite as much to influences outside the Society's scope as to the influence exerted by its trials. What the total effect has been is, however, well shown in the following quotation :—

> "The prize-engine of 1849 burned $11\frac{1}{2}$ lbs. of coal per horse-power per hour; that of 1850, $7\frac{1}{2}$ lbs.; of 1852, $4\frac{5}{8}$ lbs.; of 1853, $4\frac{1}{3}$ lbs.; of 1855, $3\frac{3}{4}$ lbs.; of 1856, $3\frac{1}{2}$ lbs.; of 1872, $2\frac{3}{4}$ lbs.; and of 1887, $1\frac{4}{5}$ lbs. per hour."

"The Agricultural Lessons of the Eighties," by Professor Wrightson, deals rather briefly with ten subjects, which have had special interest during this period. The author truly says, "never has there been a period of greater activity of thought"—"a time of greater instruction, chiefly because farmers have been induced to read and compare notes by meeting each other more than at any former period."

The influence of "combination," of "education," and of "science," are referred to, as well as those branches of agriculture which have received more especial attention, such as "dairying," "pastures," &c. Upon the subject of "Live Stock," the author writes as follows :—

> "The entire movement of the decade has been in the direction of live stock. We have arrived at a standard of excellence in breeding animals which has placed English farming on a pedestal, and we must do our best to retain that position. When a sheep can be made equal in value to an acre of corn, it is worth breeding good sheep. When the produce of a cow may be equal to three or four acres of corn, it is worth keeping good cows. There are possibilities as to live stock which there never can be with regard to corn. I must not enlarge upon this point, but if any one doubts let him look at the records of horse-breeding, cattle-breeding, sheep-breeding, and of pig-breeding, and he will see why it is that men of capital and judgment will do well to look to live stock in the future, and to relinquish the cry about the low price of wheat. Wheat lands are the best for pasture, so there is no need to despair, even as to the future of clay land."

"The Report of the Royal Commission on Horse-Breeding," by Lord Ribblesdale, is a very able and valuable summary interspersed with original views.

"Tuberculosis in Animals, and its Relation to Consumption in Man," by Mr. W. Duguid, treats of a subject which is of more interest to consumers of meat and milk than it is to farmers. Tuberculosis is a disease produced by the presence in the tissues of an animal, or man, of certain minute vegetable organisms termed bacteria. We are indebted to the researches of Professor R. Koch for the proof of the nature of tuberculosis, though its power of communication from one animal to another was known so far back as 1843.

The tubercle-bacillus—which is the name given to this bacterium—is very widely spread throughout the atmosphere of towns, and the reason why comparatively so few people suffer from consumption is that there must be a constitutional tendency or temporary weakness in the individual to enable the bacteria to take a hold upon one. The same is probably true with regard to animals. In the words of the author:—

> "The infective power of consumption in man is very low, and unless the person exposed is predisposed, either by heredity, unhealthy surroundings, or other debilitating influences, the infection is resisted, because the organism is not introduced into a suitable soil for its growth and reproduction. Were it otherwise, consumption would no doubt have steadily increased, whereas it has of late years considerably decreased. In a similar manner the infective power of tubercle in animals is very low.
>
> "The ingestion of tubercular matter by animals has proved the means of inducing the disease, and from this the question naturally arises, whether the flesh or milk of all tuberculous animals should be condemned as dangerous and unfit for human food."

Apart, however, from the necessity of a predisposing condition before, as a rule, tuberculosis can be induced in man, if it can be shown that the meat or milk of animals suffering from tuberculosis is a "means of inducing the disease," there can be no doubt that "the flesh or milk of all tuberculous animals should be condemned as dangerous and unfit for human food."

Upon this point the author writes as follows:—

> "It is true that the deposits of tubercle are seldom found in the meat, and the feeding experiments have proved that even in the advanced stages of the malady, when the milk proved infective to guinea-pigs and rabbits, the flesh in the raw state was harmless.
>
> "Meat is always cooked before being used as human food, and it has been demonstrated by Koch, Lingard, and others, that a boiling temperature for a few minutes is

sufficient to destroy the vitality and infective power of the bacillus; but milk is generally used as food without cooking, more especially in the case of children.

"Tuberculous milk must therefore be looked upon as dangerous, and likely to be the means of producing the disease in young or weakly subjects consuming it. The chief difficulty in determining whether the milk of any particular cow or cows is dangerous, lies in the inability of the veterinary surgeon to say whether there are any tubercular deposits in the udder. Milk may contain these organisms, and even a skilled bacteriologist fail to find them; their absence in the few drops which he examines is no guarantee that they may not exist. Recent experiments in America have demonstrated that where tuberculous cows showed no signs of the disease in the udder, their milk proved infective to rabbits and guinea-pigs fed with it. The results of the feeding experiments all tend to prove that the milk from tuberculous cows, if given to animals in the uncooked state, possesses a very much higher infective power than the flesh."

Too much stress cannot be laid upon the fact that the milk of a tuberculous animal is more dangerous than the flesh. When people are ill the very last substance which they are unable to take is milk—and if this milk contain the tubercle bacillus, it finds the patient in a fit condition for its rapid growth and development. How many there are who among their own friends can point to a case where consumption has followed, without any apparent cause, some entirely different ailment!

Though it is possible that the great investigator who explained the primary cause of consumption, may finally perfect a cure; yet it is imperative to prevent, so far as possible, the spread of the disease either among animals or man.

One most important step in this direction which may be confidently expected, is that further investigation will enable bacteriologists to discover with certainty whether milk contains the tubercle bacillus or not.

"Fifty Years of Hop Farming," by Mr. Charles Whitehead, F.L.S., F.G.S., is an admirable article upon a subject which the author has made peculiarly his own, and of which in his opinion it may be said—

"There is, perhaps, no branch of agriculture in which so many changes have occurred, and so much progress has been made during the last fifty years, as in hop culture. And this applies not only to the treatment of the soil, the

selection of sorts, the use of manures and modes of preventing and remedying disorders caused by insects and fungi, to whose attacks the hop plant is eminently liable, but also to the preparation of the hops for market, in the methods of picking, drying, and packing."

Every aspect of the cultivation of hops is treated, briefly, but to the point, and the author indicates how with hops—and it is true of everything else which the farmer has to produce—a greater attention to "quality" is a continually growing necessity.

"It has been patent to hop-planters for some time, and especially within the past five years, that it does not pay to cultivate inferior and ordinary kinds of hops. Quality is more than ever demanded by brewers, who will have 'coloury' samples with aroma and condition. If they cannot find these of English growth, they will take them from other countries. They give, however, the preference to English hops, as possessing, when produced in perfection, the desired combination of colour, active, 'fixed,' bitter principle, and strength, far above the hops of other climes.

"There has been considerable grubbing of low-class hops in Herefordshire and Worcestershire, especially within the last ten years, and upon the best land. Mathon's Whites, Bramlings, and Whitebine Goldings have been chiefly planted in their places, and a certain quantity of the Mayfield Grape, which is a valuable kind for picking late. It may be said that there has been more improvement in the condition, quality, and general appearance of the hop samples produced in these two counties within twenty-five years, than in any other hop districts. This is owing in a degree, no doubt, to the selection of better sorts, as well as to improved management."

"The Best Means of Increasing the Home-Production of Beef," by Mr. Gilbert Murray, commences with the assumption that—

"In the altered conditions under which we are placed, the chief aims of the British farmer must be the production of milk and of meat. The extension of breeding is a work of time. We must first increase the number of our breeding animals, and in order to do this, a great number of calves must be raised. The difficulties of rearing are less than those of securing the most desirable class of young animals, and before a sufficient supply of breeding-animals can be obtained to meet the pressing wants of an improved system, several years must necessarily elapse."

Such is the leading theme of this paper, which subsequently deals in detail with the many points arising from its consideration.

> "Whatever the breed, the first stage of improvement must begin with the male, and to this end it is essential that pure-bred sires be used.
>
> "Commencing with well-selected cows or heifers of unrecorded pedigree, on which is used a pedigree bull, it is surprising what improvement can be made in a few generations."

The advantages of building up a good herd of milking cows is dwelt upon, and the author says that, "to a tenant-farmer of ordinary intelligence he cannot conceive a more interesting and profitable branch of his calling." The paper is thoroughly practical, and contains many suggestive hints, such as the following:—

> "There is another old practice I should much like to see revived—that is spaying all the heifers not required for breeding purposes. I believe the operation is neither difficult to perform nor attended with much danger, whilst it is obvious that the quality of the beef must be better. It is unnecessary to point out, to those who are practically acquainted with the management of cattle, the check to the progress of the animal through the periodic recurrence of natural causes."

But the author does not overlook the difficulties which stand in the way of many who would willingly carry out his advice, were they in a position to do so. Thus:—

> "The chief difficulty at present to be met is the want of sufficient buildings. On many tillage farms, the accommodation for stock is very limited; and this I would on two grounds propose to supply by cheap erections. The first reason is the scarcity of available capital amongst the generality of landowners, and the second, the unstable and ever-changing conditions of agriculture, which cause a prudent man to reflect before he expends large sums on costly erections, that in a few years may become a burden to the estate to maintain."

We must, however, protest against one view of the author's, as being opposed, not only to the best teaching of science, but to the general practice of the country. The passage to which we refer is as follows:—

"On every mixed occupation I entirely repudiate the purchase of foreign feeding stuffs; the farm can and must supply all that is required for the production, both of milk and of meat."

"The Herbage of Pastures," by Dr. W. Fream, is a lengthy paper, full of details which can only be appreciated by careful reading. The most important conclusions arrived at from this investigation are, that—

"It seems desirable to distinguish between *pasture* or grazing land, and *meadow* or hayfield. That land which is more or less frequently mown differs in the relative composition of its herbage from land which is continually grazed, must be apparent from the results.

"In the mown meadows, the tendency is for Dactylis or Holcus to become predominant, and for Lolium to recede. Here, then, is a striking confirmation of an observation recorded at the beginning of 1889, by Sir John Lawes, with reference to pastures he had laid down at Rothamsted since 1872: 'Some of the new grass has never been mown, but some has been mown occasionally. Wherever it has been mown, the amount of rye-grass has much diminished; but where it has never been mown, but only fed by cattle having cotton-cake, rye-grass is abundant.' Although an important and useful grass in the hayfield,—notably in temporary seed-layers,—it is in the pasture, under the continuous treading and grazing of cattle, that rye-grass is more especially qualified to luxuriate."

3.—*The Journal of the Royal Agricultural Society of England.* Third Series, Vol. I., Part III.

"COVERED Cattle Yards," by Mr. W. J. Moscrop, is the first article in this number. It is interesting not so much for a statement or proof of the advantages of covered cattle yards, which are now generally recognised, but as an attempt to compare the relative merits of covering materials. Whatever the material used, writes the author:—

"In the construction of covered yards the first essential to be kept in view is to secure efficient ventilation. When this is wanting, cattle kept in them cannot thrive well, and one of the chief advantages desirable from their use is marred. The object of cover is to shelter, but not

to tender, and in order to do this, plenty of air must be forthcoming, but so admitted as not to impinge on the cattle, or create draughts, both being prejudicial to their health. Experience has proved that this can be best attained by openings at eaves' height of the building to let the air in, while a break high up in the roof induces a through current, and draws off the heated foul air from below.

"This is known as 'roof ventilation' (in contradistinction to 'wall ventilation,' which allows a free current of air to enter the yard over low end or side walls at a height little above that of the animals kept in it), and was an invention of the late Sir Harry Meysey Thompson."

Passing to the consideration of the covering materials employed, the author states :—

"The materials used for roof-cover of cattle yards in 1865 were chiefly slates and pantiles. . . . Within the last few years corrugated iron and boards have also been extensively used, and Felt and 'Willesden paper' partially so. The two latter I do not propose to take into consideration."

Why not? we may ask. Surely in an article which deals with a subject of importance, the treatment ought to have been complete, or else good grounds have been given for excluding these substances. They are both cheap, and easily used; and as the paper deals mainly with the expense of the various methods of covering yards, one is surprised to find them left out of consideration. Into the figures as to the relative cost of the various covering materials we do not propose to enter. Suffice it to say they have been very warmly contested in the agricultural press since the appearance of the article.

There is one system of covering which, being somewhat recent, may not be known to some of the readers of this 'Journal.' "The first to adopt it was Mr. Cundy, land-agent of Wetherby." Hence it is often spoken of as the Cundy roof.

"It consists of a covering of boards from ½ to 1 inch thick, laid on purlins of 7 inches by 2½ inches, spaced from 4½ feet to 5½ feet apart. These rest on principal rafters placed from 14 to 16 feet apart, their scantling depending on the width of span for which they are required. For ours of 30 feet, 9 inches by 3 inches is amply strong enough. For cover, well-seasoned white-wood boards—owing to greater freedom from knots—are considered best, and are more frequently used than red-wood, although it is probable that the latter for this, or any

similar outside purpose, would be more endurable. They are used in widths of 7 and 9 inches, the former preferable as being less liable to warp. Before the boards are laid, studs are driven into the purlins at the points where the boards would have come into contact with them, and the boards resting on these studs are then securely nailed to the purlins. The object of the studs is to allow a free downward course to any wet that may permeate the roof, and prevent its lodgment on the purlins, besides securing a free circulation of air between the purlins and boards, and tending to the preservation of both from decay.

"The boards are laid ¼ inch apart, giving light to the yard, and also affording the means of ventilation. Grooves about ½ inch wide and ½ inch from the edge, are made in them with the object of catching the rain when blown athwart the face of the roof, before it reaches the openings, and conducting it down to the eaves spout. A special feature of this roof is that, though the interstices give sufficient light to the yard, and air enough for good ventilation, yet the wet that finds a way through them is in quantity extremely small—quite too insignificant to infringe on the comfort of the animals or to impair the quality of the manure kept under it—indeed it has been proved that less rain penetrates than when close boarding is used. This is a curious fact, and not easily accounted for, but a fact nevertheless.

"The higher the pitch of the roof the sooner the rain gets off, and this tends to its preservation; but it is not well to go beyond a given pitch, as, when too high, the rain is found to enter in greater quantity. Lord Wenlock's agent at Escrick, Mr. Walker, who has erected a great many of these roofs, and particularly noted this point, finds a rise at an angle of 40 degrees to be the happy medium between a high and a low pitch. He also advocates a moderate rather than a wide span, finding the water does not get so well away from long-sided roofs as from shorter, and is more liable in strong winds to be blown through the openings into the yards.

"That a wooden roof is a better equaliser of temperature than any of the others herein described will be readily admitted. That the Cundy roof also attains to the first essential of covered yards—efficient ventilation—all who have had experience of them concur in affirming."

"The Seed and its Germination," by Prof. J. R. Green, gives a very lucid explanation of the chemical changes which take

place in seeds during the process of germination. It is well illustrated, and will be valuable to students of the Science of Agriculture.

"Farming in Devon and Cornwall," by Mr. F. Punchard. The author commences with a review of the past, quoting mainly from an essay by Mr. H. Tanner, published in 1848, from which it would appear that the condition of agriculture in these counties was at that time very backward.

The author truly says "much has happened since."

> "Agricultural education has greatly advanced — the extensive Showyards of the 'Royal,' and their smaller reflections in the efforts of local Societies, have led to improvement in the breeding and rearing of stock of all kinds, and to the invention and use of economical machinery, and implements."

We venture to think that the chief cause of improvement in these counties might have been found a little nearer home, and that it has been due to the influence of the Bath and West of England Society, far more than to the Royal.

Still much improvement is possible in these counties as in all others, and the paper contains information, suggestive and worthy of consideration.

Speaking of grass-land the author says:—

> "In the three to five years' leas, the rye-grasses and perennial clovers had maintained their hold, and by the end of that period the natural grasses had come up in sufficient abundance to form a sward, which was satisfactory and good enough for continuance. Apparently, all those mixtures of seeds had done best in the second, third, and fourth years, in which cocksfoot and timothy had been included; whilst, on the other hand, in some of the new leas, the red and other clovers had not maintained their hold.
>
> "To the infrequent use of lime in Cornwall, due to the absence of limestone in the county, and to the consequent high cost of it, in its calcined form, may be attributed the comparative failure of the clovers there in the second and subsequent years.
>
> "In both the old and new pastures, particularly in Cornwall, there is far too much of that veritable weed which, on account of its liability to ergot, is frequently charged with producing abortion, viz. Yorkshire Fog (*Holcus lanatus*). The prevalence of this grass in leas both young and old, points to the suspicion that its seed had been too often an adulterant in the mixture sown.

Too much care and precaution against the sowing of this weed cannot be taken now that leas are left down for extended periods; and the farmers of the two counties would do well to have samples of their seed mixtures carefully and minutely examined by some competent botanist before risking the sowing of this and other adulterants. One other common and predominant weed to be found in the old pastures of the two counties is *Carduus arvensis* (one might almost add Devoniensis), so thoroughly does it seem at home there."

Closely allied to the subject of grass-land is that of water-meadows, which form a great feature in the farming of Devonshire; but the author points out a custom which, if it exists, cannot be too strongly condemned.

"On many farms a stream of water is diverted purposely through one corner of the homestead or yard, so that the liquid manure from the foldyard and buildings can get into it, and be carried with it to some adjoining meadow. This may be, and doubtless is, a very economical method of applying the liquid manure, but when, as in too many instances seen, the pond or reservoir in the farmyard, which is used for collecting and mixing the two fluids, is made a drinking place for cattle, there can be no wonder that occasionally animals do badly, despite all other care in housing and feeding."

Speaking of the orchards in these counties the author says:—

"The cultivation and management of these is an important element in the farming of certain portions of the two counties, though it does not receive that general care and attention which it deserves. Pitiable, indeed, is the state of many of the orchards, with their fences broken down, pruning neglected, trees full of dead wood and quite hoary with the growth of lichen and moss, with other evidences of neglect too numerous to mention. Yet in many individual instances the pecuniary returns from orchards form a material portion of the profits of the farm.

"Throughout the two counties generally, there are numerous evidences of neglect of orchards in the past which will require some years of care and attention to repair. The cost of this repair, and the question of whether it should fall upon the landlord, or upon the tenant, may not infrequently be a reason for the present delay in undertaking it.

"The difficulty is not insurmountable, whilst the beneficial results which are almost certain to follow ought to encourage both parties to join in its removal."

From the author's remarks on the Live Stock of the two counties, it will be seen that the progress made during the last half-century has been considerable:—

"'The North Devon' breed of cattle is too well known to require description.

"All that the severest critics of animal form can find to urge against them is that they are 'small'; but that is a merit which butchers now-a-days profess to appreciate, especially when offered larger animals.

"The South Hammer are a large-framed and useful race, with excellent milking-qualities, and an aptitude, when arrived at maturity, for putting on flesh rapidly.

"For milk, the present race cannot be surpassed; 24 quarts daily is no unusual quantity for a South Hammer to give.

"Of the four breeds of Devon sheep, each has its special good qualities. All show an aptitude to fatten (sometimes it is feared at the expense of the supply of milk to their lambs), and all carry heavy fleeces of wool of long staple. No mountain breed anywhere can show better wool, or get to heavier weights, or arrive earlier at maturity than the Dartmoor and Exmoor flocks. At the Paris International Exhibition last year a pen of Devon Longwools took first prize and gold medal over all other long-woolled breeds, including Lincolns and Leicesters, &c."

Bearing on the above is an interesting Note in the 'Note-book,' p. 321, to which we would refer, showing how much the "Devons" are appreciated in America.

We will leave our readers to form their own opinion as to what influences have been at work to produce a result which Mr. Punchard thus describes:—

"In all his travels through the two counties he never met with bad butter, for all the butter which appeared on the hotel and other tables was invariably sweet and good. To test the keeping qualities of one dairy, a sample was taken home and kept for a month, at the end of which time it was every bit as good as at first, and had not changed its flavour."

One more extract from this Report, and if last it is not least in importance. It refers to the well-known custom in these counties of cutting up the land into very small fields, thus

entailing a large number of hedges or fences. In the author's opinion :—

> "Fully one-half of the existing fences might in places be removed without unduly exposing the land or depriving it of shelter, and much land could thereby be added to the cultivated area. Many instances were noticeable of adjoining fields of 2 to 3 acres a-piece, on the same farm, being under the same crop, where the division fences could be spared without the slightest interference with the cropping, or to the prejudice of the grazing of the seeds."

"The Report of the Society's Plymouth Meeting" may be passed over, and we come to

"The Trials of Light Portable Motors, at Plymouth," by Prof. W. C. Unwin, F.R.S. From this Report, owing to the interest taken in the subject, the great ability of the writer, and the reliability of the information, we must make the following extract on "Petroleum Engines."

> "Two petroleum engines were entered for competition, in both of which the petroleum or shale oil was vaporised, mixed with air and then exploded in a cylinder. The action of these engines is therefore very similar to that of a gas engine, with the difference, however, that the fuel used is much more portable. It may be said at once that the working of the Priestman engine was altogether satisfactory, and it worked with an economy of fuel almost unprecedented. So far as could be judged from a trial extending altogether over nearly six hours, the action of the engine was faultless, and, in spite of the high price of the fuel used, it is probable that it may in many cases supersede steam-engines for small powers and for intermittent work.
>
> "The action of the engine is this. The oil reservoir is supplied with a small amount of compressed air by the air pump. Under the action of the air-pressure the oil is driven through a carefully regulated nozzle into a vaporising chamber kept hot by the exhaust from the engine. The liquid oil is split up into spray, as it enters the vaporising chamber, and apparently evaporates instantly. In the forward movement of the piston a supply of vapour and air is drawn into the cylinder from the vaporising chamber. The return of the piston compresses the charge into the clearance space of the engine. It is then exploded by an induction spark, expands driving the piston, and on the return stroke is expelled. The cycle is similar to that of the Otto engine. A water jacket is used, as in gas engines,

to keep the cylinder cool; but it would rather seem from the observations that not only is the initial explosion rather less violent than in a gas engine, but the temperature of the cylinder is lower.

"The governing arrangement is extremely ingenious. A small high-speed governor is connected to a taper spindle, through which the oil passes to the spray-maker. The rotation of this spindle regulates the amount of oil used. At the same time a throttle valve actuated by the same governor, regulates the amount of air admitted to the vaporising chamber. In starting, a small hand pump is used to initially compress the air in the oil reservoir, and for a short time the vaporising chamber is heated by a lamp. In the first trial of the engine, the heating of the vaporising chamber began at ten hours and fourteen minutes. At ten hours twenty-seven minutes the engine started without difficulty."

From the Report on "The Trials of Grist Mills and Disintegrators," by Dan Pidgeon, Assoc. Inst. C.E., we may quote one passage as giving briefly the information of most use to our readers generally.

"The Plymouth trials may be regarded as an attempt to select from among modern improvements upon the six venerable systems of grinding, that which is best fitted for a farmer's use; and it is matter for congratulation that, having regard strictly to this problem, the experiments gave no uncertain sound in declaring that flat metal discs have the greatest general adaptability for grist milling, while they are economical of power and time, produce good feeding samples, and are cheaper both in first cost and renewals than any other mills."

Among the notes at the end of the Journal is one on "The Murchland Milking Machine," which has attracted considerable attention. The machine, however, can only be understood by means of illustrations, and the value of this apparatus has not yet been sufficiently tried to justify an opinion of its merits.

The remainder of this part of the Journal is devoted to the Reports of the Council Meetings of the Society.

4.—*The Journal of the Royal Agricultural Society of England.* Third Series, Vol. I., Part IV.

"AGRICULTURAL Administration in Austria-Hungary," by Mr. Ernest Clarke, the Editor of the 'Journal' and Secretary of the Society, is the first paper, and those who desire to know what is done by these countries will find in it much valuable information. By watching what others do, we may often learn something which we might with advantage imitate. The interest in Technical and Agricultural Education—which subjects now receive a considerable share of public attention—is largely due to our having been taught to realize what is being done in this direction abroad. And upon this subject Mr. Clarke has much to say. The quotations we shall make illustrate the concise yet effective manner in which the many other subjects noticed are dealt with:—

> "No section of the work of the two Ministries of Agriculture at Vienna and Buda-Pesth is more highly organised than that relating to agricultural education.
>
> "In Austria the schools may be divided into three great groups: Either (1) the scholars are thoroughly instructed in the practice and theory of the whole subject of agriculture; or (2) they are so far instructed that they can superintend the labour of others; or (3) they are taught only enough to enable them to manage a small farm of their own by their own manual-labour.
>
> "*State Agricultural Academy at Vienna.*—The first or highest kind of teaching, is given at the *Hochschule für Bodencultur* at Vienna, founded in 1872, and now under the direct control of the Ministry of Public Instruction, which contributes annually over 10,000*l.* to its support. The teaching-staff consists of eighteen professors, nineteen lecturers, and nine assistants; and the school has laboratories for agriculture, chemistry, technical chemistry, physiology, vegetable physiology, and anatomy, as well as a library, a museum, collections, and an experimental garden for forestry.
>
> "Only those students are eligible for the *Hochschule* who have passed through the entire course at an ordinary middle school.
>
> "The course of study is severe, and the examinations are searching. To obtain a diploma in agriculture, the candidate must pass in mathematics, mechanics, physics; land-surveying; meteorology and climatology; inorganic, organic, and agricultural chemistry; the morphology and

physiology of plants; zoology; the morphology, physiology, and pathology of domesticated animals; the theory of breeding; mineralogy and geology; drainage and water supply; the growth of crops; statistics of cultivation; agricultural implements and machinery; book-keeping and farm-management; social economy; and general agricultural administration. All this, and much more, is included in the time-table for the three years during which the student remains at the school; and the practical work, that forms an indispensable part of the course, is also elaborately provided for.

"*Intermediate Schools* (*Mittelschulen*).—Of these schools there are now sixteen, of which twelve are for agriculture, three for forestry (at Weisswasser, Bohemia; Eulenberg, Moravia; and Lemberg, Galicia), and one for fruit-growing (at Klosterneuberg, Lower Austria). None of the twelve agricultural middle schools are Government establishments, though they all receive subventions from the State. Eight are maintained by provinces, one (at Chrudim, Bohemia) by the district, and three—at Mödling (Lower Austria), Kaaden (Bohemia), and Raudnitz (Bohemia)—are supported by societies.

"Pupils before entering must have attended and have passed the four lower classes of an ordinary middle school. The aim of these intermediate schools is the training of pupils for the practical calling of farm managers. The course of teaching is spread over three years, and comprises (1) languages, literature, history, geography; (2) natural sciences; (3) the different branches of agricultural science. Natural science collections, laboratories, models, plans, and maps serve to illustrate the lectures. Farms are not considered indispensable in connection with these schools, but they have nearly all their experimental fields and gardens. After completion of the three years' course, the pupils undergo a final examination and receive a certificate.

"*Lower Schools* (*Ackerbauschule*).—The third kind of education is given at eighty-six lower schools, which are again divided into general and special schools.

"The lower schools of agriculture are intended for sons of peasants who have attended primary schools, and their object is to impart sufficient theoretical and practical knowledge to enable the students to farm their own holdings, or to act as bailiffs, farmers, and the like. The number of pupils is in some cases limited. The course is one or two years, and lessons are given on general subjects, natural

science, and agricultural subjects, with demonstrations, practical exercises, excursions, &c. The schools are expected to possess collections, illustrations, models, implements, maps, and a library. Pupils must be sixteen years of age, and must have passed an elementary school (*Volkschule*).

"It may be added by way of conclusion that the teachers both in the lower and intermediate schools are required to pass an examination, examining boards for which exist at Vienna, Prague, and Lemberg."

It will be seen from these quotations that agricultural education is given on a well-thought-out and *continuous* system. It is deserving of attention that no pupil can enter a higher school who has not passed a certain standard in a lower one. It is by such regulations that the education of a nation is made thorough.

We find the same principle recognised in the agricultural education of Hungary. The highest education is given in—

"The Academy at Altenburg, the Agricultural University for Hungary.

"Students desirous of joining it have (since 1874) been required to show that they have passed through the entire course of a high school, and have had one year's practical training.

"*Middle Schools.*—There are four intermediate schools. The pupils at these schools must be sixteen years of age, and have passed a high school up to a certain standard. The course of studies is three years, and is both practical and theoretical.

"*Lower Schools.*—In addition to the above, there are seven lower agricultural schools (*Ackerbauschulen*) established and maintained by the State. These are divided into two groups: (a) for training farm-labourers and foremen, the teaching being chiefly practical; and (b) for training managers of small farms. Pupils must be seventeen years of age, healthy and strong, and must be able to read, write, and reckon. They are bound to do the work to which they are put; and they receive board and lodging at the school, for which 12*l.* 10*s.* is payable. Part of this, however, the pupil is able to earn by his own labour. The course extends over two years, and there are no fees for teaching."

The remainder of the article contains mainly "official" information. "The actual practice of agriculture in the

Empire" will form the subject of a further article to be published in the next volume of the 'Journal,' in which we hope there will be a full description of the immense pig feeding establishment at Buda-Pesth.

"Crops for Pickling and Preserving," by Mr. W. J. Malden, is a good paper, and for those who are interested in the growth of vegetables cannot fail to afford valuable advice, but the author justly sounds at the very start a note of warning:

> "Farmers are constantly being advised to grow special crops.
>
> "And Market Garden Crops are continually referred to as likely to prove remunerative."

Because—

> "There is an enormous increase in the quantity of vegetables imported."

But, we may ask, has this acted as an incentive to English growers to extend the cultivation of vegetables? Mr. Malden considers not, and that it "has acted as a heavy handicap upon the English grower," for reasons which he very well states as follows:—

> "Foreign importations are felt the more severely because almost all these vegetables are grown in milder climates, and are placed in the English market before those grown in the open air in England are ready. As those which come into the market first realise the higher prices, the English-grown produce is only sold when prices are moderate, so that the extreme rates which were relied upon to meet the expense of the special methods necessary for the production of these crops are not realised, and the profitable nature of the business is much diminished.

For those, however, who grow vegetables, whether for pickling or not, the article contains much useful information. Thus the author says:—

> "Land upon which garden crops are grown requires to be very heavily manured, as everything is taken off; and the high rents and large amount of labour required necessitate the raising of big crops. As, therefore, the land is kept in good heart, it is not necessary to adhere to strict rotation, so that if there is a prospect of a particular crop proving more than ordinarily profitable, it can be repeated."

The following extract indicates how some vegetable growers make the most of their land:—

"Onion seed and parsley seed are often mixed together and sown at one time. The onion crop is on the ground six months or so, and is then pulled; the parsley is not injured by this, but after a hoeing to keep down the weeds, grows rapidly, and is gathered through autumn and winter. Cauliflowers, Brussels sprouts, Savoy cabbages, and other green crops are frequently planted among the small-topped varieties of early and second-early potatoes, so that when the potatoes are dug the land is still carrying a crop well on its way to maturity. Three crops are sometimes on the ground at once, the mixed seed being sown thus: radishes, carrots, and parsley. The radishes quickly become fit for pulling, and in this way make room for the carrots, which are pulled and bunched throughout summer. The ground is then left to the parsley, which being of slow growth in its early stages, does not require much space until it has been on the land some months, though it begins to grow rapidly when once well established."

The various crops are treated separately, and as illustrating the manner in which they are dealt with, we extract some quotations on the subject of—

"*Tomatoes.*—The great increase in the popularity of the tomato as an esculent has led to much attention being given to its growth during the last few years.

"The attempts to grow tomatoes in the open air have not always proved successful, owing to the uncertainty of the English climate, which in average seasons is too cold, wet, or sunless to ripen the fruit. Though the open-air cultivation of tomatoes is often recommended, yet it is doubtful if great success can be relied upon until some cheap method is discovered for preventing mildew. I am inclined, therefore, to think that tomatoes are not likely to prove a reliable crop, unless the situation and local climate are very favourable.

"Those cultivated under glass are doubtless the most profitable of the English-grown tomatoes, for they are under the control of the cultivator, and by good management can be relied upon to make a steady return.

"A point in favour of growing tomatoes in the open air is that they make most excellent pickles; and those who are not fortunate enough to be able to ripen the fruit, would do well to pay attention to this method of utilising them."

"Foot-Rot in Sheep" is a series of Notes contributed by four flockmasters, who, however, do not seem to be at all concordant

in their opinions. Mr. James Nott says, "In the case of people who are always buying sheep it is quite impossible to avoid foot-rot." "In the case of those who only breed," "no difficulty whatever in keeping free from foot-rot."

But on the other hand, Mr. C. Howard says, "I know many farms where no sheep are bought, yet foot-rot is always existing." Mr. W. J. Malden considers—

> "The predisposing cause must be sought in anything which induces the skin between the claws to rupture."

As preventives or curatives Mr. D. Buttar recommends to—

> "Pass the whole flock twice during the year through a solution of arsenic, which is thus prepared:—Boil 2 lb. of arsenic with 2 lb. of potash (pearl ash) in 1 gallon of water over a slow fire for half an hour. Keep stirring, and at any signs of boiling over pour in a little cold water; then add 5 gallons of cold water. Put this solution to the depth of 1 inch to 1½ inch (just sufficient to cover the hoofs of the sheep) in a strong, well-made, water-tight trough, 12 feet long by 18 inches wide, and about 6 inches deep, with narrow strips of wood nailed across the bottom to prevent the sheep from slipping.
>
> "Before the sheep are driven through the trough their feet should be well pared; then walk them quietly through.
>
> "If sheep are badly attacked, I would recommend passing them through the trough a second time. Should this not cure them, repeat the process in a fortnight or three weeks' time."

Mr. C. Howard uses an ointment which has the following composition:—

2 oz. verdigris, powdered.	¼ oz. caustic, powdered.
2 oz. armenic (Armenian Bole), powdered.	½ pint turpentine.
2 oz. blue stone (blue vitriol), powdered.	4 oz. Stockholm tar.
	2 oz. hog's lard.
	2 oz. oil of vitriol.

> "Pour the oil of vitriol on last, and very slowly, or it will boil over. Keep stirring with a stick until it leaves off boiling."

His system of applying this ointment is as follows:—

> "Draw out all the lame sheep, take them to some dry hovel or shed, thoroughly well pare their feet so that the disease is bottomed, and then apply the ointment. The

sheep remain in the shed, or in a dry gravelled yard, for at least one night. I am quite sure that, by the use of this ointment and with proper attention, the disease can be kept under."

The remaining Notes are taken, one from an article by Professor Brown, which appeared in this Society's 'Journal' for 1864, to which we would recommend readers to refer; and the other from a work by Professor J. H. Steel on "The Diseases of Sheep." *

"The Composition of some famous Ancient Pastures," by Professor Carruthers, like all the writings of this Botanist, is well worthy of careful study. The subject is naturally dealt with in detail, but the following generalisations speak for themselves:—

"It is no doubt important in laying down pasture to learn from neighbouring meadows what are the most suitable grasses to sow; what flourish best and what are most consumed by the stock. Superficial observers are often misled by the plants which, having been rejected by the stock, have run to seed and so make the greatest show in the autumn. The practical man does not need to have it pointed out that the grasses and other plants in a pasture which run to seed are the plants to be rejected by him, as they have been rejected by the stock."

Summarising the results of the many tables, Professor Carruthers writes:—

"The most obvious deductions from the preceding tables is that the feeding value of a pasture depends more on the quality of the soil than on the nature of the herbage of which it is composed. None of the pastures inspected approach, in feeding powers, those at Pawlett Hams, near the mouth of the Parret; and yet the grasses which form the great mass of the herbage there are of second-rate value. On a medium soil they would produce a very poor pasture. One cannot fail to be impressed with the inferior quality of the grasses that make up the herbage in a large number of these famous pastures. In some of them, no doubt, the most fitting grass has, by Nature's selection, secured a leading place, as in the case of fiorin; but too frequently a useless grass, because rejected by the stock, has taken possession of the soil, as in the case of Yorkshire fog. It is the proper work of the cultivator to clear his

* See Library, p. 373.

pastures of such intruders, and to replace them by the better grasses. This operation would add immensely to the feeding capabilities of our pasture lands."

A Report by Mr. Pidgeon on "The Trials of Cider-making Plant at Glastonbury," and one by Mr. F. Punchard on "The Farm Prize Competition of 1890," conclude the special articles. The remainder of the 'Journal' is devoted to official Reports and Notes.

5.—*Our Hardy Fruits.* By BRIAN WYNNE, F.R.H.S., Editor of 'The Gardening World.'

A GREAT deal has been written of late years upon Fruit-farming, and the advantages to be derived therefrom, but those who write and talk of the subject sometimes forget the large outlay which fruit-farming entails, the length of time which this capital must lie idle before it can bring any adequate return, the great skill necessary to make fruit-farming a success, the vicissitudes to which fruit is liable in a climate such as that of England, and, lastly, that most of our fruit trees seldom yield prolific crops except in alternate years.

Before advising men to undertake a new branch of industry, it is well to ask, Do they already make the best use of the opportunities they possess in this direction? There are probably very few farms which have not an orchard and fruit-garden attached thereto. Have farmers shown such skill in the management of these as to justify the advice that they should extend them? Have they made the most of their opportunities? Some, probably many, think they have not; and if this view is correct, we may fairly ask whether the advice which bids them extend this branch of industry is altogether justifiable. There is a widespread feeling that it is not, and that far more knowledge is needed to enable the farmers to make the most of their present opportunities of fruit-growing. That fruit cultivation, as an adjunct to farming, is not only possible but advisable, none can deny; and those who will realise that time and thought are as necessary to the study of fruit-production as they are recognised to be necessary to the successful cultivation of ordinary farm-crops, will probably find in the future that the former pays as well as the latter. But in all new departures a guide is needed, and this little book, if well studied, appears to offer an admirable guide to successful fruit-production. It is eminently practical, concise yet lucid, and a work which any intelligent farmer could easily understand and would be able to follow.

The Author thus states what he considers to be "the right course" for the farmer to pursue:—

> "In putting forth a manual on hardy fruit culture, the aim in view should be to encourage its extension especially amongst small farmers, cottagers, allotment holders, and all that class of persons who have gardens or land on their hands who are yet not classed under either of those heads. It is desirable first to induce all such persons to take an interest in the subject, and then to lead them to plant, and finally to realise that fruit culture may become to them not only a source of profit, but be productive of numerous home comforts, and a continual source of pleasure."

As an example of the way in which the author treats his subject, we will introduce some extracts from his advice on the cultivation of the apple, which, as he truly states, "without doubt stands in the very front rank of our hardy fruits."

The Apple.

"*Standard Trees.*—The standard tree is best suited for grass orchards, as the heads are well elevated above the reach of cattle or sheep. They are also best suited for market orchards, where it is intended to plant gooseberry or currant bushes underneath. In grass orchards, where ample light is needed for the pasture, the trees may be planted in rows 25 feet apart, and the trees some 20 feet asunder in the rows. This somewhat wide interval will be found none too much when the trees are twenty years old. In the case of cultivated orchards, or where bushes are planted beneath the trees, the rows may be 20 feet apart, and the trees 16 feet asunder in the rows. Standard trees are usually sold when two years old from the bud. When one year old only, they are termed 'maidens,' because chiefly consisting of one tall stem, the result of one season's growth from the bud. During the winter that stem is clean pruned at the desired height, and the top buds breaking in the second season, form neat heads of several branches. The roots at the end of the second year are also stout and fibry, and in excellent condition for transplanting. Therefore trees of two years' growth are invariably the best for general orchard planting.

"*Bush Trees.*—These are best adapted for garden culture, for forming dense plantations, or for planting on allotments. They are produced by being budded on to a very useful stock, known as the Paradise. This stock, which is of

French origin, and is the Pommier de Paradis of our Gallic neighbours, though the best form of it is known as the English or Broad-leaved Paradise, has the merit of producing a large number of fibrous roots, which do not, like those of the Crab stock, strike deep into the ground and produce coarse growth, but rather run close to the surface of the soil. For that reason the growth of the trees is rarely coarse, whilst early or precocious fruiting is encouraged. We have often seen two-year-old dwarf or bush trees on the Paradise fruiting freely in the fruit-tree nurseries, and thus affording valuable evidence of the fruitful tendency of this excellent stock. The trees worked on the Paradise, because of the shallow-spreading nature of the roots, thrive best in good garden-soil. They fruit freely, as a rule, and are thus to some extent checked in wood-production; and if the roots be both protected from drought and helped by feeding with sewage, or by means of top-dressing or mulching with long manure, the fruits are greatly enlarged and the produce increased. For all ordinary purposes, therefore, the best forms of trees are the standard for orchard planting and the bush for garden culture.

"In planting an orchard, it should be a matter of the first consideration with the planter to select a site which is freely exposed to the sun, and yet somewhat sheltered from fierce south-westerly or westerly winds. Where shelter is not furnished naturally, it is not a bad investment to plant a belt of Scotch fir-trees on the west side of an orchard, and even on the north-east side also. The first cost is comparatively trifling as compared with the value of the shelter furnished in after years."

After having stated what are the best sorts to plant, with a few words as to the nature of each variety mentioned, the very important subject of "pruning" is thus concisely dealt with.

"*Pruning Apple Trees.*—Standard or free-growing orchard trees require only an occasional thinning of the branches after they have become well established. For the first few years it is wise to go over the heads annually, and with a sharp knife remove all cross-running or badly placed branches; indeed, it is most advisable to have the heads rather thin than otherwise at first. The points of the shoots, however, should not be shortened or cut back, except where one here and there may be getting unduly long, as that form of pruning only conduces to the formation of dense bushy heads, which are not desirable, the

open well-regulated heads being those which give the highest coloured and finest quality fruits. Simple thinning, and thus keeping the heads fairly open, is therefore by far the best practice in pruning for tall trees. When the trees have become large, the thinning out of small shoots or crowded branches may be performed every second year, and this work is best done in the winter, during dry or frosty weather, and a small saw is the best tool for the purpose. In exposed positions, all standard trees should be supported by strong stakes for the first few years after planting.

"With dwarf or bush trees the growth is usually less robust than in the case of standards, but moderate thinning is desirable until they are well formed. The pruning applied when needful is what is known as summer pinching. The side shoots which break out from the branches are during July and August pinched back to about three leaf buds; the third one will break afresh, but the two back buds will swell up and later on form fruiting spurs. The third bud and its summer shoot is in the winter cut clean away. Still only very moderate pruning is needed for apple-trees worked on the Paradise stock, and, as a rule, with regular crops of fruit, the best corrective of over-luxuriance of wood growth, some occasional thinning of the branches is sufficient. Too free use of the pruning-knife is as liable to bring about a condition of unfruitfulness as is the neglect to properly thin the heads, and thus starve the trees by the density of growth."

But here the work of the fruit-grower has not ceased. It is necessary for him to place the fruit on the market, and some very valuable advice and straightforward homely truths as to how this should be done are given. Thus, with regard to apples:

"When it is desired to market apples at once, the fruits should always be selected into two sizes, termed 'firsts' and 'seconds,' and be packed with care into the ordinary baskets or barrels, according to the custom of the district. Fruits of fairly equal size not only pack best together, but sell best in the market. The grower who obtains in the trade a good reputation for his fruits because they are always carefully handled, sorted and packed, always secures the highest returns from the salesman. In this respect the foreigner beats us at work which we can do just as well; and one need only walk through any market to be quickly convinced of this—that it is the more honest system of

'sizing' and 'sampling,' and the better packing adopted by the importer, that creates a preference for his fruits against our home-grown produce."

"Our farmers and cottagers can grow good fruits as a rule, but it is notorious how few there are who understand how best to market them, or take the trouble to do so."

"If the fruits be packed into baskets, a lining of stiff paper is desirable; if in clean tubs, the fruits will admirably pack themselves. At the risk of being accused of reiteration, we again urge that too much stress cannot be laid upon putting the fruits into at least two sizes before sending them to market."

"*Marketing.*—The best markets for the disposal of fruit by the grower are undoubtedly those nearest home; but if produce must be sent long distances by road or rail, then too much care in selecting and packing, so that it shall reach its destination safely and sound, cannot well be taken. The importance of this cannot be too often urged upon the inexperienced, because, when it comes to dealing, upon the difference between good and bad packing depends the difference between profit and loss. The grower, large or small, should ever remember that the best prices are obtained by those who carefully select and size their fruits, and as carefully pack them; and that the finest samples may be greatly reduced in value if not delivered in the market in sound condition."

The above quotations will show how lucidly and practically the author has treated his subject. But he does more. Here and there are valuable pieces of advice, showing, that although not dwelt upon, the subjects touched upon have very considerable influence in the success of fruit-growing.

Thus such sentences as the following: "It must, however, be understood that all varieties of apples will not thrive equally well in all soils or positions;" and, "The trees should not in any case be planted where old trees have exhausted the soil," show clearly that in fruit-growing, as with ordinary farm crops, the soil has an important bearing upon the results. Every farmer realises this for his wheat or mangels; but how few recognise its importance with regard to fruit-production. There is another subject, moreover, which seems entirely neglected by fruit-growers, the necessity of maintaining the fertility of the soil by judicious application of suitable manure. The amount of mineral matter taken from the soil by good crops of fruit is considerable; and if wheat and barley will not thrive without this mineral matter being replenished, how can fruit

trees be expected to? This subject, though it does not receive special attention — indeed it seems to have been strangely neglected in the past, both by practical fruit-growers and their advisers—is not entirely overlooked by the author, as the following quotation relating to the advisability of allowing poultry to run on fruit-land shows:—

> "The special benefits which result from the running of poultry amidst trees and bushes are—first, that the birds manure the soil somewhat liberally in time and with one of the most valuable of fertilisers; and, secondly, that they destroy myriads of insects which would otherwise prey upon the trees or crops.
>
> "Gooseberry bushes, as is shown elsewhere, are liable to suffer severely in some season from a caterpillar, the larva of which winters in the soil beneath the bushes. Hungry fowls, with keen eyes, scratch out these insect germs and devour them with avidity, and thus a wonderful benefit is the result, as once the caterpillar gets possession of the bushes in the summer, it is indeed difficult and troublesome to destroy them. Precisely the same thing happens in relation to the larva or chrysalis of the winter moth, which attacks the apple and other fruit trees so fiercely in some years. These, though they do not winter in the soil, do repose there during the late summer and autumn, and fowls may accomplish wonders in ridding the earth of these pests."

Such is the method with which the author treats his subject, and includes in the space of sixty-three pages not only a consideration of pears, plums, cherries, gooseberries, currants, raspberries, strawberries, filberts, walnuts, blackberries and mulberries, but also a brief but very practical treatise on the insect enemies to which hardy fruits are liable, stating the most approved remedies for each.

6.—*Soils and their Properties.* By Dr. W. Fream. London: G. Bell & Sons.

Those who have paid most attention to farming recognise in the soil with which the farmer has to work, and out of which he must earn his living, mysteries so profound that modern science has as yet failed to explain them. Much has already been learnt, and every portion of that knowledge has tended to benefit farmers, and to help them in the struggle with nature. Thus, had it not been for the researches of Sir Humphry Davy

and the impetus which his lectures gave to soil analyses, we might know far less of the proper application of manures.

Unfortunately of late years there has been a tendency on the part of some practical farmers to decry soil analyses because such analyses do not give all the information needed. The evil of such a course is greater than can be well estimated. If soil analyses do not afford all the information a farmer could desire, they certainly afford some, and that most valuable information. Moreover, if practical farmers will point out to scientific men what they want, but as yet cannot obtain, they may be certain that they are taking the best course to ensure for the generation which follows them the information they themselves lack. The attention of scientific minds is thus drawn to branches of research and enquiry of practical value, and many workers will soon be found interested therein.

It is said that the analysis of a soil does not help the farmer because it does not show what constituents are available. There is only a small amount of truth in the statement, and it applies mainly to old analyses of soils. Those who have watched the progress of research abroad feel confident that such an accusation of inefficiency will not be brought against the soil analyses of the immediate future, while even the present methods of analysis are far superior to those only recently in vogue.

But there are many aspects of the study of soils other than the merely chemical and analytical one; such are those which deal with the geological formation and physical properties of soils, and it is upon these more especially that Professor Fream dwells in this little work.

The work is not without faults, some of which will be noticed; the information it contains is, however, reliable, and cannot be easily obtained elsewhere. The work, in fact, is one which, if placed in the hands of any intelligent lad, especially under a master who would explain and clear up some of the more difficult passages, could not fail to induce that spirit of observation, combined with clear reasoning, which was the main cause of the greatness of English agriculturists in the past, and will ever be of greater value in agriculture than mere book knowledge.

The work commences by describing those "first hard-rock masses which made their appearance on the earth's surface" when it "became sufficiently cooled for some portion of it to assume the solid state," and in the space of less than 200 pages the author traces the origin, and gives some of the leading characteristics and properties, of all the varied soils which now cover the United Kingdom.

It is not surprising that, in condensing so much matter into so

small a compass, the author fails at times to be absolutely clear, except to scientific readers, and being himself a scientific man, uses terms which, though familiar enough to geological students, really have little meaning to the farmer. Thus "metabolism," "biology," and a host of purely geological terms employed, represent mere sound to the average reader. Indeed, we venture to think that the word metabolism in the Introduction is misapplied. There can be no metabolism of the soil. Any change, and the word is used by Professor Fream as if it merely meant "change" in the soil, is either chemical or physical. It may be produced by metabolic changes taking place within living organisms contained in the soil, but then it is the metabolism of the organism and not of the soil. The "biology" of the soil is also surely a misnomer. It is no more correct to speak of the micro-organisms which dwell in the soil as "the biology of the soil," than it is to talk of the wheat plant as part of the biology of the soil—each in its way will affect and change chemically the nature of the soil, each is a biological cause of chemical change.

What farmer reading in the Introduction about "the biological factors in metabolic activity" would be induced to continue the perusal of this work? It is by such language—which may be necessary in a scientific work for advanced students—that scientific men alienate the sympathy of farmers from science.

We should like to see in all agricultural text-books a comprehensive and thoroughly explanatory glossary, for we feel certain that farmers would read far more, if greater pains were taken to enable them to understand what was placed before them.

The author, after having given the composition of the first formed rocks, proceeds to explain how by natural forces they are broken up.

> "Taking granite as a type of this class of rocks, it consists of a mixture of quartz and felspar in about equal proportions, together with 5 to 10 per cent. of mica. By the gradual decay of the felspar in the manner which has been described, the whole granite mass loses its coherence, its fabric is irretrievably weakened; and as the decomposed soft parts are gradually removed, that which is left behind crumbles down into a grit or gravel of quartz, spangled with flakes of mica. The longer this material is exposed to atmospheric agencies, the more completely are the residual fragments of felspar dissolved and washed away, and the more exclusively arenaceous or sandy does the loose mass become. Exposed to the rolling action of the

waves on a beach or shore line, the siliceous particles are still further reduced in size; their angles and corners are worn away, and there will ultimately result the finely divided uniform gravel which is known as sand. Such sand may, of course, be carried away by rivers, and deposited on the ocean floor, where it may get consolidated and cemented into a sandstone to be subsequently upheaved, and again exposed to disintegration and denudation, thereby giving rise to a newer and a younger sandstone. But directly or indirectly, sand and sandstone, like clay and limestone, are traceable back to the igneous rocks. Some sandstones are very pure (quartzose), others glitter with particles of mica (micaceous), and yet others are more or less clayey, owing to their still retaining fragments of felspar (felspathic).

"Where considerable areas of igneous rock are exposed at the earth's surface, it is not uncommonly the case that these have undergone extensive decomposition and disintegration *in situ*, so that they become covered with the products of their own decay. This decay may extend downwards to a very few feet only, or to more than a hundred feet; and it is very irregular in character, especially in the case of granite, some parts of the rock resisting decomposition more than others. In Cornwall the granite is so disintegrated that the country presents a surface of fine quartz grit or gravel; in Aberdeenshire it is subject to very little change. In Auvergne there are granites which have decomposed to the depth of more than 100 feet. These portions of granitic rock which resist decomposition more than others may eventually be left exposed upon the surface; thus arise the isolated 'tors' so characteristic of the scenery of Dartmoor, the Land's End, and other granite districts, whilst 'rocking stones' are due to the same cause.

"The great fact to grasp is—and it is well to repeat it—that all the constituents of sedimentary rocks can be traced back to igneous rocks. The indestructible quartz forms the base of the sandstones; the silicates, particularly those in the felspars, form the basis of all clays; lime combined with carbonic acid affords the material of the calcareous strata.

"Hence it is that a study of the products of the natural decomposition of the igneous and metamorphic rocks is competent to throw a flood of light upon the constitution and the properties of the soils which it is the province of the agriculturist to cultivate."

Three chapters follow on Sand, Clay and Limestone, from which we are tempted to make quotations, but must refer readers to the work itself.

And now again we must find fault with the author. There is not that continuity and sequence between the chapters which we would wish to see. Having explained so well the origin of the various strata, surely the next chapter should have been that on "The Origin of Soils," followed by that on the "Constitution of Soils." Then the chapters which treat of the properties of soils entitled "Capillarity," "Moisture," "Temperature," and lastly those which explain the sources of "Loss and Gain to the Soil." In a second edition the author may revise the arrangement; meantime we would advise readers of the work to take the chapters in the order here suggested. The treatment of these subjects is not merely scientific, but eminently practical. Such passages as the following are freely interspersed in the text and show that the author has throughout kept in view the practical bearing of his teaching.

> "On the limestone rocks in the south of England it is the residue from the chemical, rather than that from the mechanical, agents of disintegration, which goes to form the soil. The solvent action of rain-water containing carbonic acid in solution results in the removal, in the drainage waters, of the carbonate of lime of which these calcareous rocks mainly consist, the aluminous or earthy residue constituting a soil which is almost free from carbonate of lime. The analysis of the soil of an arable field on the Chalk slopes in South Hants in a locality where the whitish chalk-rock is within half a foot of the surface, gave only 15 per cent. of carbonate of lime; and yet to plough more than about four inches deep would result in bringing up enough chalk from the subsoil to injure the soil to such an extent that it would require the lapse of a number of years to restore it to its former condition."

The remainder of the work treats of "The Soils of the British Isles." Each rock formation is taken in its order, and the soils found upon it are described. Finally, those soils which have been deposited from water, "alluvial deposits," or from ice, "drift," and which have therefore no relation to the rocks lying beneath them, are referred to.

The following quotation illustrates the author's treatment of this part of his subject, while the soils to which he refers, namely those of the "Trias," are familiar to many of the readers of this Journal:—

"The Bunter Sandstone, or New Red Sandstone, as it is also called, is seen in parts of Yorkshire, Cheshire, Lancashire, and Central England. The reddish and variegated sandstones often yield a deep, dry, sandy soil, the fertility of which varies according to the nature of the subsoil. When the latter is of clay, the overlying soil becomes cold and wet, and requires draining; when the underlying subsoil consists of marl or marly sandstone, it is worked in with the soil to form a rich red loam, productive of luxuriant crops of every kind. The Keuper, or New Red, marls form fine rich meadows and pastures, the Cheshire cheese being the most noted product of the latter. The Trias, taken as a whole, is the most extensive formation seen on the surface in England. It extends, with some interruption, from Devonshire through Somerset, Gloucestershire, and Worcestershire, to Warwickshire, where it divides into two branches, one stretching away through Staffordshire, across the fertile plain of Cheshire into Lancashire, and the other ranging northwards through the Trent valley in Nottinghamshire, and along a strip of land in Yorkshire, to disappear beneath the sea at the mouth of the Tees. At its widest part, from Shropshire to Nottinghamshire, the Trias is eighty miles across from east to west. The sandy soils on some parts of the formation are much improved by the application of marl from other parts, hence the number of old marl pits in the Keuper.

"The general fertility of the Trias may be estimated from the fact that the three highest rented counties in England rest chiefly on it, and it has the reputation of forming the best arable land in the country. In some parts of the New Red Sandstone, however, as in Cannock Chase, there are beds of conglomerate (pebbles cemented together into hard rock), and when these appear at the surface they break up into barren gravelly soils, which are only brought under cultivation with extreme difficulty, and even now in some localities form waste land, as in Sherwood Forest. Other parts of the formation again have been overspread with glacial detritus, and in this case also the character of the soil has suffered; in the Vale of Clwyd, Denbighshire, however, where the New Red Sandstone is so overlaid, the result of the commingling is a very fertile soil. As in the case of the Old Red Sandstone, so in that of the New, orchard fruit-trees seem specially addicted to these red soils. And the cider produced by the Trias of Devonshire and Gloucestershire rivals that from the Old Red of Herefordshire.

"The Bunter Sandstone is one of the most prolific of the water-bearing strata. The Keuper marl, on the other hand, is not water-bearing. It is necessary, therefore, to penetrate the latter before a suitable supply of water is reached, and this is generally found in the underlying sandstones."

Such is the author's treatment of "the soils of the British Isles," admirable for its thorough knowledge and very practical bearing. The same qualities are also observable in the description of those alluvial soils which cover a large portion of the country, as will be seen from the following quotation :—

"The flat country, known as the Bridgwater Levels, in Somerset, consisted, at the beginning of this century, of wet useless bogs; by efficient drainage, and top-dressing with river mud, it has been gradually reclaimed, and now forms grazing-lands of the richest description, clovers and pasture-grasses thriving where once the bog-plants held undisputed sway. When a peaty soil is drained, the heaths disappear, and the Yorkshire fog or soft grass, *Holcus lanatus*, L., takes at first their place."

As describing what are termed Drift soils, and as showing the way in which they have affected the agriculture of various counties, the following quotation is of interest:—

"The true glacial drift, which is scattered pell-mell over so much of the British area, hardly extends south of the Thames, and this affords the clue to the cause of the difference between the soils resting on the Chalk area north of the Thames, and those overlying the same formation south of this river. The former consist of Boulder Clay, or of glacial sands and gravels—they are not necessarily related to the underlying rock, and are good examples of what are known as erratic or transported soils. The latter, excepting in the river valleys, are made up of the insoluble residue which is left after rain-water containing carbonic acid in solution has dissolved out of the chalk-rock most of the carbonate of lime which enters so largely—sometimes to the extent of 98 per cent.—into its composition; it takes the form of clay with flints, or of somewhat light loam, and is an apt illustration of what is meant by a local, a sedentary, or an indigenous soil, that is a soil produced *in situ*. Here, then, are two examples of totally different soils, each resting upon the same formation."

This naturally leads the author to his final chapter, in which he points out the value of maps which represent the surface

eology of the country—Soil maps. Those who have seen the oil maps published in Germany can well appreciate their value, nd it is to be hoped that in time we may possess the same for he soils of England.

A large number of analyses of soils have been made for he farmers of England, and if these analyses could be gathered ogether, collated for the various soil formations, and published vith such soil maps, much valuable information would be obtained, and general conclusions might be arrived at.

The few faults we have found with this work are small compared with the value of the information it contains, and we recommend it to those who are interested in the education of farmers' sons, as being well adapted for a text-book of agricultural geology.

NOTE.—I think Dr. Fream's account of the Bridgwater Levels in Somerset requires some qualification. He must have been misinformed about the grazing land of the richest description being found on what was useless bog at the beginning of the century. There are three kinds of grass-land in the Bridgwater Levels: (1) prime grazing land, (2) dairy land, and (3) lands frequently mown for hay and sometimes under tillage.

The prime grass-lands are for the most part on deep alluvial soil, sometimes 15 feet deep, as in the case of the Pawlet Hams, near Bridgwater. "The richest soil is found near the banks of the Parrett, the Brue, the Axe, and other rivers. As these have, from time to time, overflowed their banks, they have left a deep silty deposit of a porous character, which, resting upon the clay or peat underneath, forms a grazing soil of extraordinary fertility." "The finest lands for the purpose of grazing are those formed by the muddy deposits of the tidal rivers—the Parrett, the Yeo, and the Axe—and immediately adjoining those rivers from which they are protected by banks." The words I have quoted are taken from Mr. Sturge's excellent 'Report on the County of Somerset,' which in the most generous spirit he was good enough to print with mine. I think I am right in saying that as a general rule the bog-land, treated as described by Dr. Fream, falls under the second head, namely Dairy land, and that the best Cheddar cheese is made on such land.

It has always seemed to me a puzzle how these dairy lands maintain their productive power without an artificial supply of the phosphate which yearly goes to market in the cheese.

On the deep-grazing lands neither growing animals nor dairy cows are, as a rule, allowed to be pastured.

T. D. ACLAND.

7.—*The Diseases of Crops.* By A. B. GRIFFITHS, Ph.D., &c. Bell's Agricultural Series. London, George Bell and Sons.

THE first duty of a reviewer is to determine the scope and object of the work before him, and how far the author has carried out his intention. In this case it was "to give, in a concise form an account of the 'doings' of the more important members of the animal and vegetable kingdoms which are injurious to farm crops."

The author has done this, and having done it we are entitled to consider what want the book supplied, or might supply, and how far it attains to this end.

A work of this description is evidently intended for students or for farmers. The first difficulty which the student and farmer both labour under is, having found a diseased plant to ascertain the cause of the disease, and any work intended for them must primarily assist them in this difficulty.

The first assistance is rendered by the fact that every crop being specially liable to attacks, more or less peculiar to itself: if the plant be known, the search for the special nature of the parasite becomes limited. This the work recognises, and therefore treats of the diseases under the headings of the crops which suffer from them. But the difference between the animal and vegetable parasites is not sufficiently marked.

To distinguish between the animal parasites it is necessary that their characteristic peculiarities in every stage shall be very accurately described and differences pointed out. Moreover, it is advisable, if not essential, that careful drawings shall assist this description. Such drawings should be clear, life-size, or of a definite and stated magnification or diminution. We do not consider that either the drawings or the descriptions in this work of the various insect pests fulfil these requirements. Were there no other work on the subject they might be of some little value. In teaching students it is impossible to be too accurate or precise; we would rather a pupil should know some half-dozen well-selected typical forms of insect pests, their peculiarities and differences, than have an indefinite idea of many.

The study of the vegetable parasites of plants is more difficult than that of the animal parasites. It requires the use of a powerful magnifying glass, or even a microscope; a certain amount of skill in the use of the needle, scissors, and knife, with some little experience in preparing objects for the microscope. Without these it is difficult for any one to determine the nature of a vegetable parasite, except in its advanced stages, with certainty, and without certain knowledge, steps for "Prevention" or "Cure" become hopeless.

8.—*Insects, Fungi, and Weeds.* By R. E. MATHESON. Dublin, A. Thom and Co.

THIS is a "Blue" Book, and can be obtained of Messrs. Eyre and Spottiswoode at the small price of 10*d.*

The chief value of this "Report" is that it contains six plates of insects, with about seventy fairly well-executed figures, and is admirably adapted for use in rural schools whereby to teach pupils how to distinguish the common insect pests. The plates could be mounted on strong cardboard and varnished; this would increase their availability and durability, and would cost very little. The descriptions of the insects are too concise to be of much use. They are accompanied, however, with suggestions as to the remedial measures which might prove useful.

The second part, on "Microscopic Fungi," is neither illustrated, nor sufficiently detailed. The same may be said of Part III. on Weeds. The List of Weeds, however, would prove valuable to teachers; and if pupils in rural schools were induced to collect these weeds, by degrees many of them would be obtained, and might be pressed and mounted as specimens. Drawings of most of these weeds will be found in the Rev. C. A. John's 'Flowers of the Field,' an admirable work for a teacher in such schools.

9.—*A Manual of Injurious Insects.* By ELEANOR A. ORMEROD. London, Simpkin, Marshall, and Co.

NINE years have elapsed since the publication of the First Edition of this work, during which time the authoress, as every one interested in agriculture knows, or ought to know, has been an active worker in studying the effects of injurious insects. One is not surprised, therefore, to find this edition not only much larger, but containing nearly 100 more pages than the first edition. The work is clearly printed, admirably illustrated, and thoroughly practical, and should be in the hands of every farmer and agricultural student.

The system adopted is to treat the insects under the headings of the plants they attack, the first part being devoted to insects injurious to food crops, the second part to those which injure forest trees, while the third part is devoted to insects injurious to fruit trees and crops. As an Appendix there is a concise but lucid Introduction to Entomology. It matters perhaps little whether this is printed before or after the descriptive

portion, yet it is very necessary that it should be studied, side by side with that portion, and especially that its "Introduction" should be mastered, so that in reading the descriptive part such terms as Pupa, Larva, Imago, &c., may be clearly understood. As a short guide to these and other terms, a "Glossary" is appended, and the work has a good "Index."

Having such a work to consult, there can now be no excuse for any farmer to remain ignorant of the various insect pests by which his crops are liable to be attacked, and as the value of any remedy against such enemies very frequently consists in its being applied promptly and at an early stage of the attack, the delay necessary in sending specimens to some expert to distinguish, may be saved by the possession and study of this book.

Without a more or less prolonged study of Entomology it is not easy to distinguish the various insect pests from mere descriptions. Hence very great value must always be attached to the accuracy and clearness of the illustrations accompanying such descriptions. In this respect the work is exceptionally good; most of the drawings show both the natural size of the insect, and its appearance when magnified. We notice that the descriptions of the Figures are not always quite in order. Thus p. 94, The Corn Sawfly, "1, 2, Sawfly magnified, with natural size;" is the order of the illustrations; but "4, 5, maggot magnified, and natural size;" should be reversed. Perhaps we ought not to have mentioned this, because every reader would see at a glance what was meant, but the same reversion occurs in several of the illustrations, and now that it has been pointed out we doubt not it will be remedied in a future edition.

As an illustration of the style of this work we will make one quotation only. Every one knows the common white butterfly, yet how many know that there are really three kinds of white butterfly, or if told so, would think it possible to distinguish between them? It is no easy task to explain lucidly and yet sufficiently their differences. Yet Miss Ormerod succeeds, and in these words:—

> "The three species of cabbage and turnip butterflies just described are so much alike that it may be convenient to point out the main distinctions:—
>
> "*Eggs.*—The 'Large White' lays its eggs in *clusters*; the two other kinds lay them *singly*.
>
> "*Caterpillars.*—The caterpillar of the 'Large White' is bluish-green above, with three lines of yellow, and is *spotted with black;* also has *tufts, or a sprinkling* of hairs. The caterpillars of the two other kinds are green, but have *no black* blotches; also they are *velvety*. These two kinds

differ from each other in the 'Small White,' having three yellow *lines*, and the 'Veined White,' having a row along each side of red or reddish-yellow breathing-pores.

"*Chrysalids.*—The chrysalis of the 'Large White' is pale greenish, spotted with black; of the 'Small White' fleshy-brown, freckled with black; and of the 'Green-veined White,' pale greenish-white or yellow and freckled, with each end brown.

"*Butterflies.*—The 'Large White' usually measures about two and a half to three inches in the spread of the wings; the two other kinds are only about two inches. With regard to the markings, in the 'Large White' the patch at the tip of the fore wings is much larger, blacker, and more regularly notched on the inner side than it is in the 'Small White;' also the males of the 'Large White' have no spot (or rarely have it) on the centre of the fore wings, whilst there is usually one in the case of the 'Small White.'

"Each of the above may be easily known from the other common kind—the 'Green-veined White'—by *not* having broad green veins on the under side of the hind wings."

This quotation is alone sufficient to show the style and thoroughness of the work.

10.—*First Principles of Agriculture.* By J. MILLS, B.A., President, and T. SHAW, Professor of Agriculture, Ontario Agricultural College. Toronto: J. E. BRYANT & CO.

THIS little work, published in America for the small sum of forty cents, or 1*s.* 8*d.*, can be obtained in London from Messrs. Kegan Paul, Trübner & Co., of Ludgate Hill, for about 3*s.*, and we know of no work published in England, covering the same ground, which can be obtained for anything approaching this sum. To those who are interesting themselves in agricultural education we therefore recommend this work as a guide to show what such teaching should lead up to.

The work is well arranged, well printed, written in simple language, without any sacrifice of accuracy, and contains some well-executed illustrations.

After treating of the Soil—its improvement—and the growth and management of Crops, there are three short chapters on "The Weeds of the Farm," "The Diseases of Crops," and "Insects," subjects rarely treated in text-books, yet second to

none in practical value. The authors say, "Weeds can be subdued, and if on any farm they are not subdued, the farmer's own apathy or indolence is to blame for it."

The Principles of Feeding are next treated in a chapter of fifty pages full of condensed and valuable information.

We shall quote the opening of this chapter to show in what direction the training of the agricultural classes in America is tending; and leave our readers to draw their own conclusions as to its bearing on agricultural education in England.

> "Outlines of the Principles of Feeding. [*To the Teacher.*—The subject of this chapter is of the greatest importance to the farmer, but as it is naturally more difficult than the subjects treated of in the other chapters it is impossible to present it very simply. To treat it briefly would be only to make its difficulty greater. On the first reading of the book the parts printed in finer type had better be omitted. Nevertheless, it should be impressed on every pupil that there is nothing in the whole chapter but what he ought to know, if he wishes to understand the principles of stock-feeding thoroughly.]
>
> "WHAT THOSE ENGAGED IN FEEDING SHOULD KNOW.
>
> "The feeding of animals can be more intelligently and effectively performed when those engaged in it have a general knowledge of (1) the construction of the animal body, and the functions discharged by the principal vital organs, and the other vital processes concerned in nutrition and animal development; (2) the composition of the animal body; and (3) the composition of the various foods in common use, and the relation which their constituents bear to each other and to the constituents of the animal body which they are intended to support and develop."

This information the chapter supplies; and is followed by a chapter showing what may be termed the practical application of these principles to the Management of Stock.

Dairying is treated very briefly, and the work ends with two short chapters on "Ensilage," and "The Cultivation of Trees."

Had this little work been written for English farmers, some parts would naturally have been more fully treated and probably somewhat differently; yet it is an admirable illustration of what a short text-book should be; and we hope a similar one may some day be written by one of our leading teachers suitable for use in English schools.

11.—*Annual Report of the Norfolk Chamber of Agriculture.*

THERE is no price attached to this Annual Report, so that we are not aware whether copies can be obtained by those interested in Agricultural Experiments, but if it can be, the pamphlet is well worthy of careful study. Probably Mr. J. B. Forrester, of Norwich, the Secretary of the Chamber, would supply copies to those desirous of procuring them.

The Norfolk Chamber of Agriculture has for some years been conducting both Field and Feeding Experiments, which, we believe, were partly the outcome of an address delivered to the Chamber in 1885 by Sir Thomas Dyke Acland, and in their present Report the Council, referring to last year's Experiments, say, "they received commendation from every quarter, not the least acceptable of which was a letter with a donation to the funds, from that veteran agriculturist."

The Chamber had the advantage of finding among its members one who took peculiar interest in experiments, was well able to supervise them, and, which is far more rare, knew how to read and unravel the mysterious answers which Nature so frequently gives to the questions put to her.

Indeed, the success of these Experiments, and the interest they have elicited, is very greatly due to the indefatigable energy of the Chairman of the Experiments Committee, Mr. F. I. Cooke.

We shall rapidly pass over the results of the Wheat, Barley, Mangold, and Rotation Experiments, not for their want of interest, but because there are others we desire to notice somewhat more fully.

We gather, however, from the Report of the Field Experiments some valuable information. Thus, regarding the application of Nitrogenous Manures to Cereals, the Report says:—

> "There is much evidence from our latest results to show that, taking an average of years, it will be safe and wise for a farmer to provide that every acre of his cereal crops is supplied with enough nitrogenous, and, of course, other plant food, to produce the largest crop possible for the land."

The Report points out how very different are the results obtained in Norfolk from those which have been obtained at Rothamsted on "different but not altogether dissimilar soils," and continues: "Could there be greater justification for the alleged necessity, so to extend field experiments, that they shall cover as many varieties of soil and climate as possible?"

The indifference shown by the wheat in these Experiments to

the source of its nitrogen, and the advantage gained when mineral manures were added to the nitrogenous, are pointed out.

In the Barley Experiments nitrate of soda gave better results than sulphate of ammonia, its maximum value being reached when 1½ cwt. per acre was applied; this also gave economically the best result. The Report states:—

> "Barley is much less sensitive to unpropitious seasons, or the sickly effect of too stimulating food, than is wheat, although the quality for malting is of course often rendered coarser by extreme luxuriance."

Passing over the Mangold Experiments, we come to:—

> "An experiment with phosphatic manures in several of the different forms of commerce,"—but—"the experiment turned out so much a failure that it is not worth while to give a table of results."

With true philosophic spirit, however, the Committee do not let their failures pass without learning from them some valuable lessons, one of which we would strongly impress upon all those who undertake experiments:—

> "Even the comparative failure is by no means without its lesson, inasmuch as we are so clearly shown the very great advantage of the duplicate arrangement of the plots, which no doubt should be oftener adopted. This precaution clearly acts as the best of all checks upon erroneous and too hasty deductions, and is well worth all the extra trouble and expense involved by it."

Passing to the Experiments on Permanent Grass, the Report says:—

> "These Experiments upon permanent light land grass have lasted now long enough to show that there is a yearly deterioration in the quality of herbage from continuous mowing, whatever artificial manure may be used to restore fertility. That the folding of sheep or the application of farm dung produces much more satisfactory results, but that even with the use of them the quality of the herbage of the meadow deteriorates if continually mown."

We now come to the Experiments on Sheep Feeding, which are by far the most interesting.

> "In place of the Southdown ewe hoggets of the previous years a very level flock of capital Hampshire Down wether sheep of similar age, but perhaps a few weeks older,

were now used. The whole of them were weighed on the first day of the experiment, and a hundred of the best and most level sheep were numbered and divided into five lots of twenty in a pen. The different pens were so equally drawn that three of them were within a pound of each other in weight, and two pounds was the greatest difference.

"The experiment occupied 112 days.

"The sheep had a daily allowance of half-a-pound of hay per head, and as much sliced swede turnips as they would eat. In addition:—

"Pen I. had linseed-cake alone.

"Pen II. had linseed-cake and peas (whole) in equal proportions.

"Pen III. had linseed-cake and malt-culms in equal proportions.

"Pen IV. had linseed-cake and undecorticated cotton-cake in equal proportions.

"Pen V. had decorticated cotton-cake and barley (grittled) in equal proportions."

The results obtained are thus stated:—

"Pen V., which had the decorticated cotton-cake and barley mixture, just managed to secure the first position, but was run very close indeed by Pen III. (linseed-cake and malt-culms). Still it must or ought to be a fact of great interest and importance to farmers, that for the third time in succession the decorticated cake and barley has beaten all competitors.

"The second most productive food of the present experiments was the linseed-cake and malt-culms.

"Between the second and third best pens there is in point of increase a sensibly wider gap than between the two already noticed. Pen IV., a mixture of undecorticated cotton-cake and linseed-cake, comes next to the culms and cake, and it is a very popular food in Norfolk.

"Pens I. and II. (linseed-cake alone, and linseed-cake and peas) were very nearly equal, and but very little behind the linseed and cotton-cake pen.

"Peas have by no means justified the almost universal reputation they can boast among farmers as a supplemental food for sheep, and we have no evidence at all to show that their feeding value, as compared with that of several other foods, is equal to the comparatively rather high market price they frequently reach."

The relative economy in the entire experience of the pens is then treated in a series of tables which we may condense as follows. Calculating the expense for 100 sheep fed, and deducting the cost in purchased food for each pen from the gain in carcase of that pen as estimated at 57 per cent. of the total increase in live-weight, and as actually sold at 10*d.* per lb., we obtain :—

	Cost of Food.			Nett Return.			Gain over Pen I.		
	£	s.	d.	£	s.	d.	£	s.	d.
Pen I.	36	9	3	42	4	11	..		
„ II.	33	8	3	43	17	7	1	12	8
„ III.	26	1	0	59	13	2	17	8	3
„ IV.	30	5	3	49	12	3	7	7	4
„ V.	31	5	7	54	18	7	12	13	8

On these results the Report says :—

> "The advantage to farmers of a cake which only requires an admixture of home-grown grain to make a well-balanced and almost ideal supplemental food—practically as well as theoretical—need hardly again be insisted on. Grain alone is of very doubtful economy indeed for grazing purposes.
>
> "If then nothing else had been the outcome of our Experiments but this well-established proof of the value of a mixture of grain—probably any grain, but maize by preference when cheap enough,—and decorticated cake for grazing sheep, and for that matter, probably, grazing cattle, this fact alone is worth many hundred times more to Norfolk farmers, if they choose to make full use of it, than any outlay upon our Experiments."

Such are the results of these Norfolk Experiments. May we not learn from them the great importance of a small committee of practical men combining to work out by experiment the problems which are of common interest to their neighbourhood? What technical education can be better than this?

We venture to express a hope that in the utilisation of the money now at their disposal the County Councils will not overlook this admirable means of giving perhaps the most practical technical education in Agriculture possible.

12.—*A Treatise on the Diseases of the Sheep.* By J. H. STEEL, Professor of Veterinary Science, and Principal, Bombay Veterinary College. London: Longmans, Green and Co.

IN the Preface to this work the author gives the key-note to his treatment of the subject in the following words:—

> "It would be ridiculous to pretend that treatment of sheep in disease by the shepherd or the farmer is a thing of the past; and many an experienced owner or caretaker of flocks may greet with pleasure a work treating of scientific methods of dealing with disease, emanating from the veterinary profession, and in the absence of which he would have merely empirical or utterly unpractical works to consult in emergency." Hence "we would by no means close our pages to the non-professional reader by too free use of technicalities."

This is the basis of the treatment which the diseases of sheep receive at the hands of the author. His position is a sufficient guarantee of the accuracy of the information; while the publishers have produced the work in the thorough manner which characterises their publications.

The diseases are treated systematically according to the parts of the body they affect. Thus, the Blood, Respiratory System, Digestive System, the Skeleton and Muscular System, and others are studied in turn, and the nature of each disease to which they are liable, its symptoms and methods of prevention are comprehensively discussed. Finally, there is a Chapter on Poisons and Poisoning, followed by a List of Medicines, giving the dose of each, with its action internally and externally. The work has an exhaustive index. After a careful examination of this work we can confidently recommend it to those who desire to have by them for ready reference reliable information on the Diseases of the Sheep.

We deeply regret the news which has recently reached England that the author has been taken away from his labours by the hand of death.

13.—Farmers' Pocket Books.

1. *The Agriculturist's Pocket Book.* By E. E. Bennet. London: Baillière, Tindall and Cox.
2. *The Dairy Annual.* By James Long; and *The Poultry and Pigeon Annual.* By James Long. Both London: W. H. Allen and Co.

The business of a farmer is essentially one demanding observation, and observation necessitates note-taking, if the results are to be more than transitory. Hence we cannot understand any intelligent farmer failing to make notes of his practice, and those who make notes are well aware how their value is enhanced by having them properly arranged and tabulated. These books are so printed that besides odd daily occurrences, regular events, or those of a similar character, may be recorded in specially prepared tables.

We commend them to the notice of our readers.

Besides the diary portion of the work, each is replete with information more or less frequently needed for the calculations which have continually to be made upon a farm.

These three works are entirely distinct, and no comparison is either desirable or possible. The first is intended more especially for the arable farmer; the second, as its name implies, for the dairy farmer; and the third for the Poultry breeder.

14.—*Permanent and Temporary Pastures.* By Martin G. Sutton. London: Simpkin, Marshall, and Co.

This is the fourth edition of a work which is already well known to those who keep pace with the progress of agriculture.

It is not merely a reprint of former editions, but the author has endeavoured to bring the book up to date, "especially the first chapter, in view of the increasing importance of dairy management."

The new edition also contains illustrations of the seeds of the grasses, and "hints are added on the means of identifying various grasses when not in flower."

Unfortunately this work has reached us too late for a critical examination of its contents, so we selected and examined carefully a chapter which treats of a subject upon which we consider much has to be learnt by the majority of farmers, namely, hay-making. We must say we were surprised and pleased to find how thoroughly up to date the information was. There is one

sentence in this chapter which should be brought home to farmers on every possible occasion. It is as follows:—"There are sound reasons for urging the importance of cutting the grass young, before even the earliest varieties have formed seeds in their flower-heads."

A subject now receiving considerable attention abroad, which we do not find treated here, so far as we have had time to study the book, there being no index to help us, is the value of "aftermath." What is its real feeding value?

Mr. Sutton is well known both for his wide knowledge of grasses and his valuable experiments on their growth. Might we suggest that he would confer a lasting benefit upon farmers were he to undertake a series of experiments to determine the value of aftermath, according to the period of the first cutting; also to determine the relative food-producing powers of a meadow, when various times of cutting were resorted to?

This, however, is merely a suggestion and indicates what we want to know. That which we do know, is the subject of this work, and it is treated in an admirable manner.

Bath and West of England and Southern Counties Society.

ROCHESTER MEETING, 1890.

JUDGES.

HORSES.

Agricultural.—W. H. POTTER, Lockington Grounds, Derby; J. WALTHAM, Ash Tree House, Spalding.

Hunters, Hacks, Ponies, and Harness.—J. M. K. ELLIOTT, Lillingstone, Buckingham; P. A. MUNTZ, M.P., Dunsmore, Rugby.

CATTLE.

Devon.—J. FORRESTER, Bryanston, Blandford; W. SNELL, Broadnymett, Bow, N. Devon.

Shorthorn.—J. G. ARTIWATER, Britford, Salisbury; M. SAVIDGE, Sarsden [Lodge Farm, Chipping Norton.

Hereford.—H. HAYWOOD, Blakemore House, Hereford; S. JONES, Broadstone, Much Wenlock.

Sussex.—R. HAMSHAR, Bolney Place, Haywards Heath; A. HEASMAN, [Court Wick, Littlehampton.

Jersey.—J. LONG, Stanbridge Hall, Romsey, Hants; A. T. MATTHEWS, Lingfield, Surrey.

Guernsey.—W. ASHCROFT, Hayes, Beckenham, Kent; J. CARRE, Millmount, Guernsey.

Dairy.—W. ASHCROFT, Hayes, Beckenham, Kent; M. SAVIDGE, Sarsden, Lodge Farm, Chipping Norton.

SHEEP.

Leicester, Cotswold, Romney Marsh or Kent, and other Long-Woolled.—R. GARNE, Aldsworth, Northleach; T. POWELL, East Linham, near Maidstone, Kent.

South Down, Hampshire Down, and other Short-Woolled.—F. M. JONAS, Chrishall Grange, Royston, Cambs; H. PENFOLD, Selsey, Chichester.

Shropshire, Oxfordshire Down, Horned and Mountain.—J. BRYAN, jun., Southleigh, Witney, Oxon; C. R. KEELING, Cedar Villa, Penkridge, Stafford.

Inspectors of Shearing.—H. FARTHING, Thurloxton, Taunton; H. MAYO, 4, Temple Terrace, Dorchester.

PIGS.

R. FOWLER, Broughton Farm, Aylesbury; W. J. HENMAN, Caversham, Reading.

DAIRY, &c.

Cheese, Butter, and Cream.—J. ALLEN, Shepton Mallett, Somerset; Prof. CARROLL, Albert Farm, Glasnevin, Dublin; JUBAL WEBB, High Street, Kensington, London, W.

Jersey Cattle Butter Test.—T. H. WEETMAN, Rose Hill, Atherstone, [Warwickshire.

Butter Workers.—Prof. CARROLL, Albert Farm, Glasnevin, Dublin; T. RIGBY, Sutton Weaver, *viâ* Warrington.

Dairy Appliances.—Prof. CARROLL, Albert Farm, Glasnevin, Dublin; B. DYER, B.Sc., F.C.S., &c., 17, Great Tower Street, London, E.C.

Hops.—J. NORWOOD, 15, Southwark Street, London, S.E.

Wool.—J. T. HADDON, 7, Palmerston Edgs., Bradford, Yorks; F. PRENTIS, Milton, Sittingbourne.

Poultry.—J. DIXON, North Park, Clayton, Bradford; W. B. TEGETMEIER, [346, Strand, London, W.C.

Horse Shoeing.—T. D. BROAD, Broad Street, Bath.

Preserved Fruit and Appliances.—C. WHITEHEAD, F.L.S., Barming House, [Maidstone.

AWARDS OF PRIZES FOR STOCK, 1890.

*** An animal designated in this list as the "reserve number" is entitled, *conditionally*, to succeed to any prize that may become vacant in its class by reason of the animal placed above it by the Judges failing afterwards to qualify.

† Animals, where not otherwise stated, may be considered to have been bred by the Exhibitor.

ABBREVIATIONS EXPLAINED:—S., sire; d., dam; s. of d., sire of dam; y., year; m., month; w., week; d., day.

HORSES.

FOR AGRICULTURAL PURPOSES.

CLASS 1.—*Stallion, foaled before* 1888. **Eight entries.**

First Prize, 25*l.*; J. S. HODGSON, Lythe Hill, Haslemere, Surrey, bay Clydesdale, *Young Merry Monarch* (8407), 3 y., 4 w., 2 d.; s., Merry Monarch (538); d., Lorna (3704); s. of d., Black Watch (64).

Second Prize, 10*l.*; W. GILBEY, Elsenham Hall, Essex, black Shire, *King Henry* (7499), 5 y., bred by J. Shelton, Carlton Grange, Newmarket; s., Staunton Hero (2918): d., Withersfield Brown (vol. v.); s. of d., Hearty of Oak (1009).

Reserve, P. A. MUNTZ, M.P., Dunsmore, Rugby, dark bay Shire, *Moulton Conqueror* (6178), 4 y., bred by — Thirlby, Ibstock, Leicestershire; s., Yeoman (4192); d., Nailstone Dapper (vol. xxviii.); s. of d., William the Conqueror (2343).

Highly Commended, LORDS A. and L. CECIL, Orchardmains, Tunbridge, brown Clydesdale, *Cottager*, 3 y., 2 w., 1 d.; s., Claymore (3522); d., Lady of Avenel (3332); s. of d., The Abbot (1320).

CLASS 2.—*Stallion, foaled in* 1888. **Three entries.**

First Prize, 20*l.*; P. A. MUNTZ, M.P., Dunsmore, Rugby, black Shire, *Headon Black Knight*, 2 y., bred by E. E. Harcourt Vernon, Grove Retford: s., Bar None (2388), d., Grove Blackie (vols. viii. and ix.), s. of d., Farmer (5041).

Second Prize, 10*l.*; Not awarded.

CLASS 3.—*Colt, foaled in* 1889. **Three entries.**

First Prize, 10*l.*; LORDS A. and L. CECIL, Orchardmains, Tunbridge, bay Clydesdale, *Crusader*, 1 y., 1 m., 2 w., 1 d.; s., Claymore (3522); d., Edith Plantagenet (6040); s. of d., Belted Knight (1395).

Second Prize, 5*l.*; P. A. MUNTZ, M.P., Dunsmore, Rugby, bay Shire, *Dunsmore Ambassador*, 1 y., 3 m.; s., Surprise (3352); d., Pride of Dunsmore; s. of d., Canute (2736).

Reserve, J. S. HODGSON, Lythe Hill Farm, Haslemere, Surrey, brown Clydesdale, 11 m., 3 w., 5 d.; s., Sir Hildebrand (4024); d., Dinah 2nd (3590); s. of d., Clan Alpine (1098).

CLASS 4.—*Mare and Foal, or in-Foal.* **Three entries.**

First Prize, 15*l.*; LORD WANTAGE, V.C., K.C.B., Lockinge, Wantage, bay Shire and foal, *Honest Girl*, 7 y.; bred by Mrs. Hook, Shenton, Warwickshire; s., Honest Tom 2nd.

Second Prize, 10*l.*; LORD HOTHFIELD, Hothfield Place, Ashford, Kent, grey Shire and Foal, *Ornament*, 5 y.; s., Thumper; d., Star; s. of d., Lofty.

CLASS 5.—*Filly, foaled in* 1887. Four entries.

First Prize, 10*l.*; LORD HOTHFIELD, Hothfield Place, Ashford, Kent, brown Shire, *Sowerby Lass*, 3 y.; bred by R. Stuart, Sowerby Hall, Darstang; s., Garnet (2787); d., Pink; s. of d., Honest Tom (1105).

Second Prize, 5*l.*; LORDS A. and L. CECIL, Orchardmains, Tunbridge, bay Clydesdale, *Clara*, 3 y., 1 m., 3 w., 2 d.; s., Claymore (3522); d., Darling (1093); s. of d., Topsman (886).

CLASS 6.—*Filly, foaled in* 1888. Eight entries.

First Prize, 10*l.*; LORDS A. and L. CECIL, Orchardmains, Tunbridge, brown Clydesdale, *Chrystabel*, 1 y., 5 d.; s., Claymore (3522); d., Lady of Avenel (3332); s. of d., The Abbot (1320).

Second Prize, 5*l.*; W. GILBEY, Elsenham Hall, Essex, grey Shire, *Vivid* (vol. xi.), 2 y.; s., Royal Spark (4659); d., Boadicea (vol. viii.); s. of d., Premier (2646).

Reserve, LORD HOTHFIELD, Hothfield Place, Ashford, Kent, bay Shire, *Villisten*, 2 y.; bred by W. Gilbey, Elsenham Hall, Essex; s., Staunton Hero (2918); d., Chocolate; s. of d., Birkland (133).

HUNTERS.

CLASS 7.—*Mare or Gelding, foaled before* 1886, *up to* 14 *stone.* Four entries.

First Prize, 25*l.*; C. C. HAYWARD, Southill, near Biggleswade, Beds, brown mare, *Pantheon*, 6 y., bred by — Coales, Chicherly, near Newport Pagnell, Bucks; s., Pedometer; d., Duchess; s. of d., Mulatto.

CLASS 8.—*Mare or Gelding, foaled before* 1886, *up to* 12 *stone and under* 14 *stone.*—First prize, 25*l.*—Second prize 10*l.*

[NO ENTRY.]

CLASS 9.—*Mare or Gelding, foaled in* 1886. Three entries.

First Prize, 20*l.*; G. W. DANCOCKS, Tolworth Court Farm, Surbiton, bay mare, *Daisy*, 4 y., 1 w.; s., Clanronald; d., Duchess; s. of d., Marsyas.

Second Prize, 10*l.*; G. SLATER, Canterbury, brown gelding, *Tornado*, 4 y.; s., Snowstorm.

CLASS 10.—*Filly or Gelding, foaled in* 1887. Three entries.

First Prize, 10*l.*; G. W. DANCOCKS, Tolworth Court Farm, Surbiton, brown gelding, *The Duke*, 3 y., 1 w., 4 d.; s., Clanronald; d., Duchess; s. of d., Marsyas.

Second Prize, 5*l.*; C. C. HAYWARD, Southill, near Biggleswade, Beds, bay gelding, *Swiss Boy*, 3 y.; s., by Muleteer.

CLASS 11.—*Filly or Gelding, foaled in* 1888. Three entries.

First Prize, 10*l.*; G. G. CAPON, 63, Mortimer Street, London, W., chestnut half-bred filly, *Speculation*, 2 y., 1 m., 2 w., 5 d.; s., Cistercian.

Second Prize, 5*l.*; G. G. CAPON, brown bay half-bred gelding, *Monk*, 2 y., 3 w., 1 d.; s., Cistercian.

CLASS 12.—*Filly or Colt, foaled in* 1889. Three entries.

First Prize, 10*l.*; G. G. CAPON, 63, Mortimer Street, London, W., bay half-bred filly, *Defiance*, 1 y., 1 m., 1 d.; s., Cistercian; d., Bonny Glen; s. of d., Strathconan.

Second Prize, 5*l.*; W. S. FORSTER, Gore Court, Maidstone, chestnut hackney stallion, *Otham Bacchus*, 1 y., 4 w., 1 d.; s., Reality; d., Stepping Stone.

Reserve, G. G. CAPON, bay half-bred gelding, *Limerick*, 1 y., 1 m.; s., Cistercian.

CLASS 13.—*Mare and Foal, or in-Foal.* Four entries.

First Prize, 20*l.*; W. H. G. HOGG, Westerham, Kent, chestnut, in-f *Prudence*, 8 y.

Second Prize, 10*l.*; W. H. G. HOGG, chestnut, in-foal, *Maid of Kent*, 12 s., Impulse.

Reserve and Highly Commended, W. H. DUNN, Templeton, Hunge roan half-bred and foal, *Maid Marion*, 18 y.; s., Robin Hood; d., Ama s. of d., Cameleopard.

Commended, G. G. CAPON, 63, Mortimer Street, Regent Street, Lon grey half-bred, *Bonnie Glen*, 8 y.; s., Strathconan; with foal a 1 m., 3 d.

HACKS.

CLASS 14.—*Mare or Gelding, over* 14·2 *hands.* One entry.

First Prize, 10*l.*; G. SLATER, Canterbury, bay mare, *The Marchioness*, 4 Second Prize, 5*l.*; No entry.

CLASS 15.—*Mare and Foal, or in-Foal, not over* 14·2 *hands.*
First Prize, 7*l.* Second Prize, 3*l.*
[NO ENTRY.]

PONIES.

CLASS 16.—*Mare or Gelding, not over* 13 *hands.* Two entries.

First Prize, 7*l.*; W. J. BECKINGHAM, Upper Ashe, Micheldever, Ha bay Welsh mare, *Lena*, 4 y.

Second Prize, 3*l.*; C. TUFF, Albion House, Borstal, Rochester, br Welsh filly, *Gipsy*, 5 y.

CLASS 17.—*Mare and Foal, or in-Foal, not over* 13 *hands.*
First Prize, 5*l.* Second Prize, 3*l.*
[NO ENTRY.]

HARNESS.

CLASS 18.—*Mare or Gelding, over* 14 *hands and not over* 15·2.
One entry.

First Prize, 10*l.*; G. SLATER, Canterbury, roan gelding, *Barnum*, aged.
Second Prize, 5*l.*; No entry.

CLASS 19.—*Mare or Gelding, over* 13 *hands and not over* 14.
First Prize, 10*l.* Second Prize, 5*l.*
[NO AWARD.]

CLASS 20.—*Mare or Gelding, under* 13 *hands.* Two entries.

First Prize, 7*l.*; A. E. FLETCHER, Miles Place, Delce Road, Rochest bright bay gelding, *Dolly*, 6 y., 2 d.; s., King Tom 2nd; d., Nancy.

Second Prize, 3*l.*; G. BERRY, 7, High Street, Strood, Kent, dun Wels mare, *Gip*, 5 y.

CATTLE.

(*All ages calculated to the* 5*th of June*, 1890.)

DEVON.

CLASS 21.—*Bull, calved in* 1886 *or* 1887. Four entries.

First Prize, 15*l.*; J. FARTHING, Currypool, Bridgwater, red, *Robin H* (2305), 3 y., 2 m., 1 w.; s., Master Walter (1808); d., Robin's Duchess 3r (6293); s. of d., Royal Duke (1640).

Second Prize, 10*l.*; J. F. R. MORRIS, Marwood, Barnstaple, red, *Primrose's Duke*, 2 y., 6 m., 4 w., 2 d.; s., Daisy's Duke (1704); d., Primrose (8620); s. of d., Agricola.

Third Prize, 5*l.*; R. BICKLE, Bradstone Hall, Tavistock, red, *Fancy's Robin 2nd* (1966), 4 y., 2 m., 1 w., 1 d.; s., Gladstone (1737); d., Fancy (5297); s. of d., Stockley Prince (1454).

CLASS 22.—*Bull, calved in* 1888. One entry.

First Prize, 15*l.* Second Prize, 10*l.* Third Prize, 5*l.*

[NO AWARD.]

CLASS 23.—*Bull, calved in* 1889. Four entries.

First Prize, 15*l.*; A. C. SKINNER, Pound Farm, Bishop's Lydeard, Somerset, red, *Fancy's Gordon*, 1 y., 4 m., 1 d.; s., General Gordon (1974); d., Fancy 7th (8991); s. of d., Lord Currypool (1589).

Second Prize, 10*l.*; EARL OF DARTMOUTH, Pattshull, Wolverhampton, red, *Detective*, 1 y., 2 m., 3 d.; s., Lord Stowey (1601); d., Dawdle (7881); s. of d., Dispersion (1707).

Third Prize, 3*l.*; R. BICKLE, Bradstone Hall, Tavistock, red, *The Count*, 1 y., 4 m., 3 w.; s., Champion (1696); d., Countess 2nd (5958); s. of d., Narcissus (1617).

CLASS 24.—*Cow, in-Milk or in-Calf, calved before* 1887. Two entries.

First Prize, 15*l.*; Sir W. WILLIAMS, Bart., Heanton, Barnstaple, Devon, red, *Flower 2nd*, 4 y., 3 d.; s., Eclipse; d., Flower 8th; s. of d., Young Palmerston.

Second Prize, 10*l.*; A. C. SKINNER, Pound Farm, Bishop's Lydeard, red, *Duchess 17th* (8988), 3 y., 11 m., 3 w., 5 d.; s., Lord Currypool (1589); d., Duchess 7th (5260); s. of d., Duke of Farrington (1323).

CLASS 25.—*Heifer, in-Milk or in-Calf, calved in* 1887. One entry.

First Prize, 15*l.*; Sir W. WILLIAMS, Bart., Heanton, Barnstaple, Devon, red, *Flame 3rd*, 3 y., 3 m., 3 d.; s., Eclipse; d., Famous 4th; s. of d., Lord Stowey.

Second Prize, 10*l.*; No entry. Third Prize, 3*l.*; No entry.

CLASS 26.—*Heifer, calved in* 1888. Three entries.

First Prize, 10*l.*; Sir W. WILLIAMS, Bart., Heanton, Barnstaple, Devon, red, *Friendly 3rd*, 2 y., 4 m., 2 w., 6 d.; s., Foreman 2nd; d., Friendly 2nd; s. of d., Candy.

Second Prize, 5*l.*; A. C. SKINNER, Pound Farm, Bishop's Lydeard, red, *Rosebud*, 2 y., 3 m., 3 w., 6 d.; s., General Gordon (1974); d., Moss Rose 8th (7017); s. of d., Lord Stowey (1601).

Third Prize, 3*l.*; R. BICKLE, Bradstone Hall, Tavistock, red, *Queen 5th* (9987), 2 y., 2 d.; s., Gladstone (1737); d., Queen 3rd (5969); s. of d., Narcissus (1617).

CLASS 27.—*Heifer, calved in* 1889. Four entries.

First Prize, 10*l.*; Sir W. WILLIAMS, Bart., Heanton, Barnstaple, red, *Fiction 2nd*, 1 y., 1 m., 3 w., 3 d.; s., Foreman 2nd; d. Fiction; s. of d., Duke of Flitton 17th.

Second Prize, 5*l.*; A. C. SKINNER, Pound Farm, Bishop's Lydeard, Somerset, red, *Rosebud 2nd*, 11 m.; s. General Gordon (1974); d., Moss Rose 8th (7017); s. of d., Lord Stowey (1601).

Third Prize, 3*l.*; R. BICKLE, Bradstone Hall, Tavistock, red, *Beatrice 7th*, 11 m., 3 w., 4 d.; s., Champion (1696); d., Beatrice 2nd (3187); s. of d., Earl of Hexworthy (1091).

SHORTHORNS.

Class 28.—*Bull, calved in* 1886 *or* 1887. Five entries.

First Prize, 15*l.*; J. D. Willis, Bapton Manor, near Codford, Wilts, roan, *Hercules*, 4 y., 2 m., 1 w., 3 d.; bred by A. Davidson, Cairnbrogie, Co. Meldrum, N.B.; s., Clear the Way (47,604); d., Helen Raglan 4th; s. of d., British Prince (36,282).

Second Prize, 10*l.*; A. E. W. Darby, Little Ness, Shrewsbury, roan, *Proconsul Pippin* (56,360), 2 y., 10 m., 2 d.; bred by J. Houlton, Ladbarrow; s., Prince Frogmore's Seal (48,488); d., Probus Pippin; s. of d., Earl of Probus (46,307).

Third Prize, 5*l.*; C. W. Brierley, Rosedale, Tenbury, Worcestershire, roan, *Bangle*, 2 y., 6 m., 3 w., 6 d.; bred by J. D. Willis, Bapton Manor, Codford; s., Young Briton (49,201); d., Bracelet; s. of d., Lazarus (45,039).

Reserve and Commended, H. A. Brassey, Preston Hall, Aylesford, roan, *Snowball*, 4 y., 3 m., 3 w.; bred by S. Hudson, Wytneford Hall, Shrewsbury; s., Knight of Gwynne; d., Snowy 5th; s. of d., Right Honourable (50,309).

Class 29.—*Bull, calved in* 1888. Eight entries.

First Prize, 15*l.*, and Reserve for Extra Prize; J. D. Willis, Bapton Manor, Codford, roan, *Sir Douglas*, 2 y., 4 m., 1 w., 4 d.; bred by — Kendrew, Droitwich; s., Laberius (54,523); d., Gwendoline 2nd; s. of d., Pall Mall (46,836).

Second Prize, 10*l.*; C. W. Brierley, Rosedale, Tenbury, Worcestershire, red and white, *Martinet*, 2 y., 3 m.; bred by A. M. Gordon, Newton, Insch, Aberdeenshire; s., Mario (51,713); d., Patience; s. of d., Dr. A. Duff (46,167).

Third Prize, 5*l.*; J. Handley, Greenhead, Milnthorpe, Westmoreland, white, *White Pasha*, 2 y., 2 m., 3 d.; bred by R. Thompson, Inglewood, Penrith; s., Royal Baron (50,354); d., Pearl Armlet; s. of d., Beau Benedict (42,769).

Reserve and Highly Commended, J. Handley, roan, *Ingram's Swell*, 1 y., 8 m., 3 w., 3 d.; bred by the late W. and J. T. Taylor, Hall Garth, Kirkleatham; s., Ingram's Faith (54,468); d., Lady Garth; s. of d., Prince of Oxford (45,408).

Commended, D. Collard, Garrington, Littlebourn, Wingham, Kent, roan, *Royal Windsor 2nd*, 2 y., 3 m., 5 d.; bred by C. Collard, Little Barton, Canterbury; s., Royal Windsor (53,614); d., Cherry Sweetheart; s. of d., Cherry Duke of Gloucester (36,348):—and H. Leney, Court Lodge, West Farleigh, Kent, roan, *Barming Waterloo Emperor*, 1 y., 8 m., 3 w., 2 d.; s., Rowfant Grand Duke (52,014); d., Empress of Waterloo; s. of d., Oxford's Prince (34,998).

Class 30.—*Bull, calved in* 1889. Three entries.

First Prize, 15*l.*, and Extra Prize, 20*l.* *; J. D. Willis, Bapton Manor, Codford, roan, *Count Lavender*, 1 y., 3 m., 2 d.; bred by W. Duthie, Tarves, N.B.; s., Norseman (56,233); d., Sweet Lavender; s. of d., Earl of March (33,807).

Second Prize, 10*l.*; C. W. Brierley, Rosedale, Tenbury, Worcestershire, roan, *Viscount Knightly*, 1 y., 3 m., 2 w., 2 d.; bred by G. F. King, Chewton Keynsham, Bristol; s., Knightly (57,540); d., Countess 8th; s. of d., Lord Somerset 8th (48,247).

Third Prize, 3*l.*; J. Handley, Green Head, Milnthorpe, Westmoreland, roan, *Ingram's Pride*, 1 y., 2 m., 3 w., 5 d.; s., Royal Derwent (56,463); d., Princess; s. of d., Lord of Grange.

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* Given for the best Bull in Classes 29 and 30.

CLASS 31.—*Cow, in-Milk or in-Calf, calved before* 1887. Five entries.

First Prize, 15*l.*; R. THOMPSON, Inglewood, Penrith, Cumberland, roan, *Inglewood Gem*, 4 y., 8 m., 3 w.; s., Royal Baron (50,354); d., Inglewood Belle; s. of d., Beau Benedict (42,769).

Second Prize, 10*l.*; C. W. BRIERLEY, Rosedale, Tenbury, Worcestershire, roan, *Rosedale Nun*, 6 y., 4 m., 3 w., 5 d.; s., Rosedale Oxford (48,597); d., Snowflake; s. of d., Bolwar's Farewell (33,173).

Third Prize, 3*l.*; C. C. HAYWARD, Southill, Biggleswade, roan, *Park Empress 2nd*, 10 y., 3 m., 1 w., 5 d.; bred by Executors of the late E. Pease, Crundalls, Worcestershire; s., Foster Brother (36,661); d., Empress 2nd; s. of d., Knight of Athelstane (26,533).

Reserve and Highly Commended, C. W. BRIERLEY, roan, *Marchioness of Waterloo 6th*, 3 y., 9 m., 2 w., 1 d.; bred by W. H. Tremaine, Sherborne, Northleach, Gloucestershire; s., Earl of Oxford (51,185); d., Marchioness of Waterloo 1st; s. of d., 3rd Duke of Waterloo (23,801).

Commended, H. LENEY, Court Lodge, West Farleigh, Kent, rich roan, *Buckland Kirklevington*, 4 y., 1 m., 2 w., 6 d.; s., Gerald 3rd (46,419); d., Kirklevington Duchess 13th; s. of d., Duke of Tregunter 2nd (26,022).

CLASS 32.—*Heifer, in-Milk or in-Calf, calved in* 1887. Three entries.

First Prize, 15*l.*; C. W. BRIERLEY, Rosedale, Tenbury, Worcestershire, white, *Rosedale Graceful*, 3 y., 4 m., 2 w., 6 d.; s., Ruckley (50,398); d., Rosedale Snowflake; s. of d., Rosedale Oxford (48,597).

Second Prize, 10*l.*; C. C. HAYWARD, Southill, Biggleswade, dark roan, *Empress of Southill*, 3 y., 2 m., 3 w., 5 d.; s., Lord Airdrie (53,118); d., Park Empress 2nd; s. of d., Foster Brother (36,661).

Third Prize, 3*l.*; Not awarded.

CLASS 33.—*Heifer, calved in* 1888. Six entries.

First Prize, 10*l.*, and Extra Prize, 15*l.*; * C. W. BRIERLEY, Rosedale, Tenbury, Worcestershire, roan, *Grace Darling*, 1 y., 7 m., 2 w.; bred by R. Stratton, The Duffryn, Newport, Monmouth; s., Signet (55,037); d., Grace Gazelle; s. of d., Rowfant Duke of Oxford (43,936).

Second Prize, 5*l.*; R. THOMPSON, Inglewood, Penrith, Cumberland, roan, *Windsor's Beauty*, 2 y., 3 m., 2 w.; s., Model (53,322); d., Home Beauty 3rd; s. of d., British Sovereign (36,285).

Third Prize, 3*l.*; C. C. HAYWARD, Southill, Biggleswade, roan, *Empress of Southill 2nd*, 2 y., 2 m., 5 d.; s., Lord Airdrie (53,118); d., Park Empress 2nd; s. of d., Foster Brother (36,661).

Reserve and Commended, A. E. W. DARBY, Little Ness, Shrewsbury, roan, *Queen of Adcote*, 2 y., 2 m., 2 w., 2 d.; s., Czar (49,348); d., Queen of Warlaby 4th; s. of d., Paul Potter (38,854).

CLASS 34.—*Heifer, calved in* 1889. Eight entries.

First Prize, 10*l.*, and Reserve for Extra Prize; C. W. BRIERLEY, Rosedale, Tenbury, Worcestershire, red and white, *Rosedale Empress*, 1 y., 4 m., 2 w., 1 d.; s., Rosedale Comet (56,432); d., Empress 18th; s. of d., Earl of Siddington 2nd (44,755).

Second Prize, 5*l.*; R. THOMPSON, Inglewood, Penrith, Cumberland, roan, *Merry Millicent*, 1 y., 2 m., 1 w., 5 d.; s., Merry Sunshine (56,185); d., Inglewood Rose; s. of d., Master Dragonfly (34,807).

Third Prize, 3*l.*; R. and G. HARRISON, Underpark, Lealholm, Grosmont, Yorks, roan, *Rosemary*, 1 y., 5 m., 2 d.; s., Prince Magnus (56,333); d., White Rose; s. of d., Duke of Rainton 5th (39,778).

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* Given for the best Heifer in Classes 33 and 34.

Reserve and Highly Commended, H. LENEY, Court Lodge, West Farleigh, Kent, roan, *Barming Foggathorpe*, 1 y., 1 m., 1 d.; s., Lord of the Manor (56,078); d., Miss Foggathorpe 4th; s. of d., 6th Duke of Oneida (30,997).

Highly Commended, C. C. HAYWARD, Southill, Biggleswade, roan, *Butterfly Gwynne*, 6 m., 2 w., 4 d.; s., Lord Butterfly 2nd (57,591); d., Nell Gwynne, s. of d., Lord Airdrie (53,118).

Commended, A. E. W. DARBY, Little Ness, Shrewsbury, red, *Ness Cranberry*, 1 y., 2 m., 1 d.; s., Royal Sportsman (54,990); d., Cold Cream 4th; s. of d., Gerald 3rd (46,419):—and his roan, *Ness Dewberry* 2nd, 11 m., 2 w., 2 d.; s., Czar (49,348); d., Hill Dewberry 2nd; s. of d., Olai (40,406).

HEREFORD.

CLASS 35.—*Bull, calved in* 1886 *or* 1887. One entry.

First Prize, 15*l.*; R. PALMER, Lodge Farm, Nazeing, Waltham Cross, red with white face, *Bombardier* (12,869), 2 y., 11 m., 3 d.; s., Rosestock (6651); d., Lilian (vol. xiii.); s. of d., Rodney (4907).

Second Prize, 10*l.*; No entry. Third Prize, 5*l.*; No entry.

CLASS 36.—*Bull, calved in* 1888. Six entries.

First Prize, 15*l.*; A. E. HUGHES, Wintercott, Leominster, red with white face, *Endale* (13,773), 2 y., 4 m., 6 d.; bred by E. Yeld, Endale, Leominster; s., Hilarity (8734); d., Fraulein Wilton; s. of d., Lord Wilton (4740).

Second Prize, 10*l.*; W. H. COOKE, The Green, Shelsley Kings, Worcester, red with white face, *Grove Wilton 4th* (13,846), 2 y., 2 m., 3 w., 3 d.; s., Grove Wilton 3rd (11,295); d., Leinthall Symmetry; s. of d., Downton Grand Duke (5878).

Third Prize, 5*l.*; W. T. CRAWSHAY, Cyfarthfa Castle, Merthyr Tydfil, red and white, *Cyfarthfa Venture*, 1 y., 8 m., 3 w., 5 d.; s., Cyfarthfa Picture (9788); d., Downton Violet; s. of d., Downton Boy (5877).

Reserve and Highly Commended, J. H. ARKWRIGHT, Hampton Court, Leominster, red with white face, *Spring Jack* (14,191), 2 y., 5 m., 3 d.; s., Hilarity (8734); d., Lively 10th; s. of d., Conjuror (5264).

Commended, EARL OF COVENTRY, Croome Court, Severn Stoke, red with white face, *Good Songster*, 2 y., 3 m., 2 w., 1 d.; s., Good Boy (7668); d., Silver Song; s. of d., Minstrel (8915):—and W. T. CRAWSHAY, red and white, *Cyfarthfa Jew*, 2 y., 3 m., 3 w., 1 d.; s., Cyfarthfa Picture (9788); d., Cyfarthfa Jewess; s. of d., Downton Magnet (6912).

CLASS 37.—*Bull, calved in* 1889. Nine entries.

First Prize, 15*l.*; H. W. TAYLOR, Showle Court, Ledbury, red with white face, *Lord Tredegar*, 1 y., 4 m., 5 d.; s., Victorious (11,820); d., Wintercott 10th; s. of d., Franklin (6961).

Second Prize, 10*l.*; A. E. HUGHES, Wintercott, Leominster, Herefordshire, red with white face, *Ironclad*, 1 y., 4 m., 3 w., 3 d.; s., Hiero (7707); d., Lofty; s. of d., Rudolph (6660).

Third Prize, 3*l.*; J. RANKIN, M.P., Bryngwyn, Tram Inn, R.S.O., Herefordshire, red and white face, *Senator*, 1 y., 4 m., 3 w., 6 d.; s., Gerald (12,152); d., Sunflower (vol. xiii., p. 414); s. of d., Spartan (5009).

Reserve and Highly Commended, R. PALMER, Lodge Farm, Nazeing, Waltham Cross, red with white face, *Chafewax*, 1 y., 4 m., 3 w.; s., Crown Prince (8464); d., Rouge 5th; s. of d., Rose Stock (6651).

Highly Commended, J. H. ARKWRIGHT, Hampton Court, Leominster, red with white face, *Rose Cross 2nd*, 1 y., 4 m., 2 w., 1 d.; s., Iroquois 3rd (13,147); d., Curly 23rd; s. of d., Rose Cross (7237):—and R. PALMER,

red with white face, *Crœsus*, 1 y., 3 m., 3 w., 6 d.; s., Crown Prince (8464); d., Dove; s. of d., Moses (5471).

Commended, J. RANKIN, M.P., red with white face, *Vincent*, 1 y., 3 m.; s., Laocoon (10,147); d., Viola (vol. xix., p. 590); s. of d., Bangham (6793).

CLASS 38.—*Cow, in-Milk or in-Calf, calved before* 1887. Four entries.

First Prize, 15*l.*; EARL OF COVENTRY, Croome Court, Severn Stoke, red with white face, *Rosewater*, 4 y., 3 m., 1 w., 2 d.; s., Rare Sovereign (10,499); d., Rosemary; s. of d., Grove 3rd (5051).

Second Prize, 10*l.*; T. FENN, Stonebrook House, Ludlow, red with white face, *Bravura* (vol. xviii., p. 281), 4 y., 2 w., 5 d.; bred by Earl of Coventry; s., Good Boy (7668); d., Bertha (vol. xiii, p. 321); s. of d., Commander (4452).

Third Prize, 3*l.*; W. T. CRAWSHAY, Cyfarthfa Castle, Merthyr Tydfil, red and white, *Cyfarthfa Violet 2nd*, 3 y., 10 m., 1 w., 4 d.; s., Stockton Prince (10,688); d., Downton Violet; s. of d., Downton Boy (5877).

Highly Commended, Colonel BRIDGFORD, C.B., Kinnersley, Hereford, red with white face, *Princess* (vol. xx., p. 226), 5 y.; s., Regulator (6637); d., Victoria 2nd (vol. xvii., p. 273); s. of d., Regulus (4076).

CLASS 39.—*Heifer, in-Milk or in-Calf, calved in* 1887. Five entries.

First Prize, 15*l.*; EARL OF COVENTRY, Croome Court, Severn Stoke, red with white face, *Ladywood*, 3 y., 5 m., 2 d.; s., Adelbert (8185); d., Lady Spencer; s. of d., Monkton Lad (5646).

Second Prize, 10*l.*; R. EDWARDS, The Sheriffs, Kington, Herefordshire, red with white face, *Psyche*, 3 y., 1 m., 1 d.; s., Magnet (8873); d., Pretty Face; s. of d., Landseer (7074).

Third Prize, 3*l.*; E. S. GODSELL, Salmon's Spring Brewery, Stroud, red with white face, *Cornflower*, 3 y., 2 m., 1 w., 2 d.; bred by J. W. Smith, Thinghill Court, Hereford; s., Grand Duke 2nd (7674); d., Crinky (vol. xviii.); s. of d., Duke of Clarence (6410).

Commended, E. S. GODSELL, red with white face, *Bright Eyes*, 3 y., 2 m., 28 d.; bred by J. W. Smith; s., Grand Duke 2nd (7674); d., Beauty 2nd (vol. xvii.); s. of d., High Minster (6484).

CLASS 40.—*Heifer, calved in* 1888. Seven entries.

First Prize, 10*l.*; T. FENN, Stonebrook House, Ludlow, red with white face, *Downton Fancy* (vol. xx., p. 315), 2 y., 4 m., 3 w., 5 d.; s., Bourton (11,005); d., Lady Buttercup (vol. xiv., p. 329); s. of d., Moonraker 3rd (6077).

Second Prize, 5*l.*; R. EDWARDS, The Sheriffs, Kington, Herefordshire, red with white face, *Sheriffs' Sunlight*, 2 y., 4 m., 3 w., 6 d.; s., Magnet (8873); d., Sparkle; s. of d., King of the Lilies (3892).

Third Prize, 3*l.*; T. FENN, red with white face, *Windsor Belle* (vol. xx., p. 315), 2 y., 3 m., 2 w., 2 d.; s., Bourton (11,005); d., Longhorns (vol. xiv., p. 330); s. of d., Longsides (5434).

Reserve and Highly Commended, H. W. TAYLOR, Showle Court, Ledbury, red with white face, *Mignonette*, 2 y., 4 m., 2 w., 4 d.; s., Victorious (11,820); d., Wintercott 10th; s. of d., Franklin (6961).

Commended, R. GREEN, The Whitterne, Kington, Herefordshire, red and white, *Balsam 3rd*, 2 y., 2 w.; s., Don Quixote (12,076); d., Miss Perfection (vol. xvi., p. 242); s. of d., Lord Wilton (4740).

CLASS 41.—*Heifer, calved in* 1889. Fourteen entries.

First Prize, 10*l.*; R. GREEN, The Whitterne, Kington, Herefordshire, red and white, *Sunbeam*, 1 y., 3 m., 3 w., 5 d.; s., Washington 2nd (11,834); d., Silver Weed (vol. xvii., p. 398); s. of d., Rosestock (6651).

Second Prize, 5*l.*; H. W. TAYLOR, Showle Court, Ledbury, red with white face, *Lady Lavender*, 1 y., 3 m., 1 w., 2 d.; s., Jeremiah (13,154); d., Nellie Brown 3rd; s. of d., Captain (5791).

Third Prize, 3*l.*; T. FENN, Stonebrook House, Ludlow, red with white face, *Princess of the Teme*, 1 y., 4 m., 2 w.; s., Viscount Wilton (11,824); d., Downton Cherry (vol. xvii., p. 373); s. of d. (Auctioner 5194).

Reserve and Highly Commended, H. W. TAYLOR, red with white face, *Agnes*, 1 y., 5 m., 4 d.; s., Maidstone (8875); d., Pansy; s. of d., Franklin (6961).

Highly Commended, EARL OF COVENTRY, Croome Court, Severn Stoke, red with white face, *Golden Fleece*, 1 y., 4 m., 1 w., 1 d.; s., Rare Sovereign (10,499); d., Golden Fortune; s. of d., Adelbert (8185):—R. GREEN, red and white, *Diana*, 1 y., 2 m., 4 d.; s., Whittern Grove (10,843); d., Duchess 5th; s. of d., Corsair (5271):—and R. PALMER, red with white face, *Rolypoly*, 1 y., 3 m.; s., Crown Prince (8464); d., Red Rose 5th; s. of d., Captain (5238).

SUSSEX.

CLASS 42.—*Bull, calved in* 1886 *or* 1887. Four entries.

First Prize, 15*l.*; W. WOOD, jun., Hassocks, Sussex, red, *Jubilee* (826), 3 y., 3 m., 3 w., 4 d.; bred by C. Child, Slinfold, Horsham; s., Buffer (663); d., Juno (2874),; s. of d., Berry (259).

Second Prize, 10*l.*, and Extra Prize, 20*l.*;* B. FIELD, Beechy Lees, Otford, Sevenoaks, red, *Goldfinder* (821), 2 y., 10 m., 4 w., 2 d.; s., Goldsmith (391); d., Dewberry (2217); s. of d., Bedford (316).

Third Prize, 5*l.*; C. LUCAS, Warnham Court, Horsham, red, *Golden Horn* (754), 4 y., 1 m., 3 w.; s., Goldsmith (391); d., Lavant 4th (2881); s. of d., Robinson Crusoe (361).

Reserve and Highly Commended, A. STANFORD, Eatons, Ashurst, Steyning, Sussex, red, *Successor* (942), 3 y., 3 m., 2 w., 5 d.; bred by E. and A. Stanford, Eatons, Ashurst, Steyning; s., Goldsmith (391); d., Cowden 1st (1599); s. of d., Knight Errant (206).

CLASS 43.—*Bull, calved in* 1888. Nine entries.

First Prize, 15*l.*, and Extra Prize, 20*l.*†; AYLESBURY DAIRY COMPANY (Limited), Horsham, Sussex, red, *Lord Oxeye*, 1 y., 9 m., 1 w., 5 d.; bred by R. Whitehead, Paddockhurst; s., Goldidust 11th (677); d., Marguerite (4066); s., Frankenstein 4th (540).

Second Prize, 10*l.*; E. and J. HUNTER, Randolph's Farm, Hurstpierpoint, Sussex, red, *Alfred 2nd*, 1 y., 11 m., 2 w., 7 d.; bred by Sir H. R. Burrell, Bart., Park Farm, West Grinstead, Sussex; s., King Alfred (827); s. of d., Mr. Vickress' Goldfinder.

Third Prize, 5*l.*; W. S. FORSTER, Gore Court, Maidstone, red, *Tycoon*, 2 y., 4 m., 2 w., 4 d.; s., Mikado (705); d., Magdala 20th (2650); s. of d., Dorchester (325).

Reserve and Highly Commended, Sir F. A. MONTEFIORE, Bart., Worth Park, Crawley, *Jupiter* (930), 2 y., 6 m., 5 d.; bred by C. Child, Slinfold; s., Buffer (663); d., Judy (3758); s. of d., General Roberts (500).

Commended, Hon. J. R. DE CLARE BOSCAWEN, Badsell Park Farm, Matfield, Staplehurst, red, *Father Thames*, 2 y., 2 m., 5 d.; s., Papa (709); d., Tidebrook (3118); s. of d., Prince:—D. T. SMITH, Woolton Bridge, Canterbury, red, *Udimore 4th*, 2 y., 3 m., 1 w., 2 d.; bred by A. Holmes, Udimore, Rye, Sussex; s., Udimore 3rd; d., May Flower 2nd:—and A. WARDE, West Waltheigh, Maidstone, red, *Udimore 3rd*, 2 y., 4 m., 5 d.; bred by A Holmes, Prince ore, Rye; s., Ruby 2nd (721); d., Gentle 2nd.

Highly for the best Bull in Class 42, calved in 1887, that has been on servic with white ring 1889.
(13,147); d for the best Bull in Classes 43 and 44.

CLASS 44.—*Bull, calved in* 1889. Seven entries.

First Prize, 15*l.*; J. S. HODGSON, Lythe Hill, Haslemere, Surrey, red, 1 y., 2 m., 1 w., 1 d.; s., Silversmith (849); d., Peace 2nd; s. of d., Royal Kilburn.

Second Prize, 10*l.*; J. GODMAN, Park Hatch, Godalming, Surrey, red, *Oxford Duke 4th*, 1 y., 3 m., 2 w., 2 d.; s., Oxford Duke (708); d., Noble Lady (2911); s. of d., Napoleon 3rd (396).

Third Prize, 3*l.*; W. S. FORSTER, Gore Court, Maidstone, red, *Hemlock* (1002), 1 y., 1 m., 4 w.; s., Careful (741); d., Wadhurst Marygold; s. of d., Lord Charles.

Reserve and Highly Commended, W. WOOD, jun., Hassocks, Sussex, red, *Oxford 6th*, 1 y., 4 m., 2 w.; s., Oxford 2nd (771); d., Browny 4th (3402); s. of d., Golding (597).

Commended, L. HUTH, Possingworth, Waldron, Sussex, red, *Lord Beckley 13th*, 1 y., 2 w., 3 d.; s., Lord Beckley 10th (922); d., Virgin 9th (2963); s. of d., Sir William (471):—and W. WOOD, jun., red, *Sir John Berry*, 1 y., 2 m., 1 w., 5 d.; s., Sir John (851); d., Berry 7th (2993); s. of d., Young Hartley 1st (481).

CLASS 45.—*Cow, in-Milk or in-Calf, calved before* 1887. Five entries.

First Prize, 15*l.*; J. GODMAN, Park Hatch, Godalming, Surrey, red, *Columbine 2nd* (3191), 6 y., 6 m., 1 w., 5 d.; s., Napoleon 3rd (396); d., Columbine (2203); s. of d., Petworth (211).

Second Prize, 10*l.*; W. S. FORSTER, Gore Court, Maidstone, red, *Rosebud 1st* (3825), 8 y., 5 m., 2 w., 2 d.; bred by — Charrington, Reigate; s., Frankenstein (328); d., Young Cleopatra (2509).

Third Prize, 3*l.*; L. HUTH, Possingworth, Waldron, Sussex, red, *Virgin 19th* (4449), 4 y., 1 m., 4 d.; s., Fitzgerald (498); d., Virgin 9th (2963); s. of d., Sir William (471).

Reserve, H. M. COBB, Higham, Rochester, red; bred by the late R. Neame, Fairbrook, Faversham.

CLASS 46.—*Heifer, in-Milk or in-Calf, calved in* 1887. Six entries.

First Prize, 15*l.*; W. S. FORSTER, Gore Court, Maidstone, red, *Prim* (4390), 3 y., 1 m., 2 w.; 1 d.; s., Mikado (705); d., Tidy.

Second Prize, 10*l.*; J. S. HODGSON, Lythe Hill Farm, Haslemere, Surrey, red, *Peace 6th*, 3 y., 4 m., 3 w., 2 d.; s., Prince Rufus (515); d., Peace 2nd (2916); s. of d., Royal Kilburn (401).

Third Prize, 3*l.*; B. FIELD, Beechy Lees, Otford, Sevenoaks, Kent, red, *Primrose* (4121), 3 y., 4 m., 2 w., 1 d.; s., Golddust 2nd (593); d., Hardy 10th (3048); s. of d., Goldsmith (391).

Reserve and Highly Commended, T. A. VICKRESS, Hill House, Slinfold, Horsham, red, *Noblesse* (4099), 2 y., 10 m., 3 w., 6 d.; s., Buffer (663); d., Norfolk 1st (2453); s. of d., Berry (250).

Commended, L. HUTH, Possingworth, Waldron, Sussex, red, *Virgin 20th* (4451), 2 y., 11 m., 4 w.; s., Lord Beckley 6th (700); d., Virgin 17th (3856); s. of d., Fitzgerald (498).

CLASS 47.—*Heifer, calved in* 1888. Eight entries.

First Prize, 10*l.*; J. GODMAN, Park Hatch, Godalming, red, *Noble Lady 4th* (4420), 2 y., 4 m., 3 w., 5 d.; s., Oxford Duke (708); d., Noble Lady 2nd (3541); s. of d., Gold Boy (541).

Second Prize, 5*l.*; W. S. FORSTER, Gore Court, Maidstone, red, *Peeress* (4386), 2 y., 4 m., 3 w., 5 d.; s., Careful (741); d., Princess 2nd (3325); s. of d., Pacific (514).

Third Prize, 3*l.*; W. S. FORSTER, red, *Damsel* (4712), 2 y., 1 m., 2 w., 4 d.; s. Careful (741); d., Pretty Maid 6th (3563); s. of d., Honest Boy (504).

Reserve and Highly Commended, B. FIELD, Beechy Lees, Otford, Sevenoaks, Kent, red, *Berry 9th*, 2 y., 4 m., 1 w., 1 d.; s., Young Hereford (860); d., Berry 8th (3902); s. of d., Oxford 1st (513).

Highly Commended, Major M. G. BEST, Park House, Boxley, Maidstone, red, *Butterfly* (4288), 2 y., 2 m., 1 w. 2 d.; s., Careful (741); d., Mayfly.

Commended, H. F. L. KING, Oakhurst Manor, Billingshurst, red, *Gentle 5th*, 1 y., 10 m., 2 w., 4 d.; bred by Lord Pelham-Clinton-Hope, Deepdene, Dorking; s., Stanford (728); d., Gentle 3rd (3237):—G. WHITE, Hunton, Maidstone, red, *Redleaf*, 2 y., 2 m., 3 w.; s., Udimore; d., Rosebud; s. of d., Royalist:—and W. WOOD, jun., Hassocks, Sussex, red, *Stormy 6th* (4570), 1 y., 10 m., 3 w., 4 d.; d., Stormy 3rd (3834); s. of d., Percy (712).

CLASS 48.—*Heifer, calved in* 1889. Ten entries.

First Prize, 10*l.*, and Extra Prize, 15*l.**; Major M. G. BEST, Park House, Boxley, Maidstone, red, *Pearl*, 1 y., 5 m., 4 d.; s., Goldsmith (391); d., Alice.

Second Prize, 5*l.*; J. S. HODGSON, Lythe Hill, Haslemere, Surrey, red, *Crocus 3rd*, 1 y., 5 m., 1 d.; s., Silversmith (849); d., Crocus 2nd (2349); s. of d., Hereford (263).

Third Prize, 3*l.*; J. GODMAN, Park Hatch, Godalming, red, *Royal Weston 3rd*, 1 y., 4 m., 3 w., 5 d.; s., Oxford Duke 1st (840); d., Weston 2nd (3862); s. of d., Lord Surrey (548).

Reserve and Highly Commended, G. WHITE, Hunton, Maidstone, red, *Ninon*, 1 y., 2 m., 1 w., 5 d.; s., Ruby 2nd (721); d., Nelly; s. of d., Sweet William (369).

Highly Commended, B. FIELD, Beechy Lees, Otford, Sevenoaks, red, *Berry 10th*, 1 y., 4 m., 1 w., 1 d.; s., Young Hereford 1st (860); d., Berry 8th (3902); s. of d., Oxford 1st (513):—and E. HUSSEY, Scotney Castle, Lamberhurst, red, 1 y., 3 m., 3 w.; s., Bullion; d., Border.

Commended, W. S. FORSTER, Gore Court, Maidstone, red, *Buttercup 3rd* (4701), 1 y., 4 m., 1 w., 1 d.; s., Mikado (705); d., Buttercup 2nd (2791); s. of d., Bedlam 1st (448):—and J. GODMAN, red, *Royal Weston 4th*, 1 y., 4 m., 4 d.; s., Oxford Duke (708); d., Royal Weston 1st (3100); s. of d., Napoleon 3rd (396).

JERSEY.

CLASS 49.—*Bull, calved in* 1886 *or* 1887. Four entries.

First Prize, 15*l.*; J. BLYTH, Wood House, Stansted, Essex, grey, *Grouville's Champion*, 3 y., 2 m., 3 w., 1 d.; bred by W. G. Aubin, St. Saviour's, Jersey; s., Everton King (1565); d., Maufant Princess (6004 F.S.C.).

Second Prize, 10*l.*; Captain R. A. VANSITTART, Barham Court, Teston, Maidstone, *Royal Gem*, 3 y., 3 m., 3 w.; bred by Captain P. Le Brocq, St. Mary's, Jersey; s., Pomona's Prince (754 P.S.); d., Princess Teck (6392).

Third Prize, 5*l.*; Not awarded.

CLASS 50.—*Bull, calved in* 1888. Five entries.

First Prize, 15*l.*; J. BLYTH, Wood House, Stansted, Essex, dark fawn, *Sir Joseph*, 1 y., 8 m., 2 w., 2 d.; bred by G. E. HAWKINS; s., Sir Josephus (H.T.); d., Bella's Fancy; s. of d., Georgius (417 J.H.B.).

Second Prize, 10*l.*; Mrs. A. F. PERKINS, Oak Dene, Holmwood, Surrey, dark, *Bombardier*, 2 y., 3 m., 2 w., 2 d.; bred by F. Surcouf, St. Laurence, Jersey; s., Miltiades (2678), d., La Petite Cousine; s. of d., Nero (1848).

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* Given for the best Heifer in Classes 47 and 48.

Third Prize, 5*l.*; Hon. Mrs. C. Howard, Dutchlands, Great Missenden, Bucks, grey, *Hypothesis*, 1 y., 5 m., 2 w., 5 d.; bred by Mrs. Barton, Logner Hall, Shrewsbury; s., Huxley (1693); d., Amy; s. of d., St. Albans (1229).

Reserve, H. C. Smith, Mount Clare, Roehampton, dark grey, *Viscount*, 2 y., 2 m., 2 w., 1 d.; bred by J. B. Currie, Esher; s., Wolseley's Champion; d., Perry Farm Silver; s. of d., Christo (1441).

Class 51.—*Bull, calved in* 1889. Twenty entries.

First Prize, 15*l.*; J. Brutton, 7, Princes Street, Yeovil, fawn, *Vulcan*, 1 y., 4 m., 4 w., 1 d.; bred by J. L. de Gruchy, St. Martin's, Jersey; s., Jolly Boy (921 J.H.B.); d., Lady Horace (7131).

Second Prize, 10*l.*; J. Blyth, Wood House, Stansted, Essex, grey, *Carlo's Fancy*, 1 y., 1 w., 5 d.; s., Carlo 3rd (2308); d., Fancy's Daisy (imp.); s. of d., Khira (759 J.H.B.).

Third Prize, 3*l.*; J. W. Crookes, Little Testwood, Totton, Hants, brown, *Pomona's Daisy*, 1 y., 1 m., 1 w., 5 d.; s., Pomona's Boy (2774); d., La Pusse 4th (410 E.J.H.B.); s. of d., Forget-me-not (1595).

Reserve and Very Highly Commended, G. Simpson, Wray Park, Reigate, dark silver grey, *Bessie's Monopolist*, 1 y., 4 w., 2 d.; s., Monopolist (2685); d., Bessie (vol. iv., p. 157); s. of d., Noble 2nd (1172).

Very Highly Commended, Lord Rothschild, Tring Park, Herts, brown, *Albany*, 1 y., 4 m., 3 w., 5 d.; bred by F. Surcouf, St. Laurence, Jersey; s., Fairplay (1038 J.H.B.); d., Petite Cousine (5037 H.C.); s. of d., Baron Chief (246):—H. C. Smith, Mount Clare, Roehampton, fawn, *Marmaduke*, 1 y., 3 w., 4 d.; s., Duke Martyn; d. Beauty; s. of d., Messenger (1816):—and W. D. Tucker, 78; High Street, Southampton, dark grey, *Nestor 8th*, 1 y., 4 m., 3 w., 4 d.; bred by C. Mourant, St. Saviour's, Jersey; s., Nestor 7th; d., Gambage 2nd; s. of d., Oscar (410).

Highly Commended, W. Arkwright, Sutton Scarsdale, Chesterfield, grey, *Scarsdale Dundee*, 11 m., 9 d.; s., Marmalade; d., Scarsdale Monte Carlo; s. of d., Carlo 3rd:—J. R. Corbett, More Place, Betchworth, Surrey, dark fawn, *Butterfly*, 1 y., 1 m., 4 w., 3 d.; s., Franciscan; d., Bessie 5th; s. of d., Neston's Prince:—and H. J. Cornish, Thornford, Sherborne, Dorset, dark grey, *Sambo*, 1 y., 3 m., 2 w., 5 d.; bred by J. R. Vautier, St. Peter's, Jersey; s., Kaiser's Prince (993 J.H.B.); d., Lily of St. Peter's (7101 J.H.B.).

Commended, J. W. Crookes, grey fawn, *Pomona's Desire*, 10 m., 2 w., 3 d.; s., Pomona's Boy (2774); d., Primula 4th (547); s. of d., Rowley King (1980):—Lord Rothschild, dark drey, *Columbus*, 1 y., 3 m., 3 w., 5 d.; bred by T. Renault, St. Mary's, Jersey; s., Blue Prince (1071, P.S.), d., Clemence (7353 F.S.):—and G. Simpson, fawn, *Rosy's Champion*, 1 y., 2 m., 1 w., 3 d.; s., Franciscan (2449); d., Rosy 3rd (vol. iv., p. 576); s. of d., Wolseley (2165).

Class 52.—*Cow, in-Milk or in-Calf, calved before* 1887. Twenty-nine entries.

First Prize, 15*l.*; J. Blyth, Wood House, Stansted, Essex, fawn and white, *Victoria*, 4 y., 4 m., 1 w., 5 d.; bred by J. Falle, St. Martyn's, Jersey; s., Wolseley (2165); d., Gentille 3rd (879 J.H.B.).

Second Prize, 10*l.*; J. Blyth, lemon fawn, *Sweet Secret*, 7 y., 5 m., 3 w., 4 d.; bred by G. Collas, Grouville, Jersey; s., Cicero (1444); d., Secret (2375 J.H.B., F.S.C.).

Third Prize, 3*l.*; J. W. Crookes, Little Testwood, Totton, Hants, light fawn, *Mazzini's Pride*, 6 y., 11 m., 3 w., 5 d.; bred by J. Du Val, Augurez, St. Peter's, Jersey; s., Mazzini (326 H.C.); d., Autune (3492).

Reserve and Very Highly Commended, H. J. CORNISH, Thornford, Sherborne, Dorset, grey, *Six Rues Belle 3rd*, 6 y., 1 m., 1 w., 5 d.; bred by J. J. Remon, St. Laurence, Jersey; s., Angelus Lad (1307); d., Six Rues Belle (2618 J.H.B.)

Very Highly Commended, W. ARKWRIGHT, Sutton, Scarsdale, Chesterfield, grey fawn, *Carillon*, 4 y., 9 m., 20 d.; bred by J. A. Gibaut, Trinity, Jersey; s., Ejeon, d., Concorde; s. of d., Brown Prince:—J. BRUTTON, 7, Princes Street, Yeovil, broken, *Golden Lass 4th*, 4 y., 2 m., 2 w., 6 d.; bred by — Marett, St. Saviour's, Jersey; s., Sultan's Cicero, (J.H.B. vol. viii., 670); d., Golden Lass (J.H.B., vol. vi., 5711):—and LORD ROTHSCHILD, Tring Park, Herts, grey, *Pontorson*, 5 y., 1 m., 3 w., 3 d.; bred by J. Gallois, St. Clement's, Jersey; s., Happy Cetewayo (2499); d., Congo (1135 J.H.B., P.S.C.); s. of d., Le Boulevard (1748).

Highly Commended, LORD ROTHSCHILD, fawn, *Miss Alice* (J.H.B., 2161 H.C.); 4 y., 11 m., 4 w.; bred by G. Bellot, Grouville, Jersey; s., Count Cicero (398 H.J.B., P.S., H.C.), d., Lady Alice 3rd (901 J.H.B.); s. of d., Forget-me-not (J.H.B., 291 H.C.):—and for his creamy fawn, *Spot* (7437 J.H.B.); 4 y., 2 m., 2 w., 3 d.; bred by J. Le Morgnau, St. John's, Jersey; s., Sir Garnet (405); d., Bremen (4063).

Commended, J. BLYTH, solid fawn, *Lily of Beaumont 2nd*, 4 y., 1 w., 2 d.; bred by Captain Burrows, St. Peter's, Jersey; s., Wolseley (2165); d., Lily of Beaumont (6451 J.H.B.):—LORD ROTHSCHILD, fawn, *Madeira 3rd*, 4 y., 3 m., 2 w., 3 d.; bred by E. Renouf, Jersey; s., Wolseley (2165); d., Renouf's Madeira (2090 J.H.B., F.S.C.):—and G. SIMPSON, Wray Park, Reigate, silver grey, *Patricia 4th*, 5 y., 1 m., 2 w., 4 d.; s., Farmer's Joy (1075); d., Patricia (vol. iii., p. 308); s. of d., Romeo (760).

CLASS 53.—*Heifer, in-Milk or in-Calf, calved in* 1887. Sixteen entries.

First Prize, 15*l.*; J. BLYTH, Wood House, Stansted, Essex, grey fawn, *Fancy's Daisy*, 3 y., 2 m., 1 w., 2 d.; bred by C. Mauger, St. John's, Jersey; s., Khiva (759 J.H.B.); d., Fancy (780 J.H.B.); s. of d., Carlo (180 P.S.)

Second Prize, 10*l.*; J. BLYTH, whole, *Brebis 6th*, 3 y., 1 m., 2 w., 3 d.; bred by T. Le Sueur, St. Saviour's, Jersey; s., Everton King (1565); d., Brebis 3rd (1798 J.H.B.).

Third Prize, 3*l.*; LORD ROTHSCHILD, Tring Park, Herts, fawn grey, *Les Champs Rault 2nd*, 3 y., 3 m., 3 w., 4 d.; bred by F. R. G. Cabot, Trinity, Jersey; s., Fred Archer (779 J.H.B.); d., Les Champs Rault (3803 J.H.B.).

Reserve and Very Highly Commended, G. SIMPSON, Wray Park, Reigate, Surrey, fawn, *Rosy 4th*, 3 y., 2 m., 7 d.; s., Rosy's Wonder (835 J.H.B., P.S.); d., Rosy 3rd (vol. iv., p. 576); s. of d., Wolseley (2165).

Very Highly Commended, Mrs. A. F. PERKINS, Oak Dene, Holmwood, Surrey, dark grey, *Trifle*, 3 y., 3 m., 4 w., 1 d.; s., La Ferriere's King (2587); d., Daisy; s. of d., Tommy (1264).

Highly Commended, H. J. CORNISH, Thornford, Sherborne, Dorset, grey brown, *Eleonora*, 2 y., 7 m., 1 d.; bred by J. P. Falle, St. Martin's, Jersey; s., Prince of Waverley (731 J.H.B.); d., Duchess of Waverley (5879 J.H.B.).

Commended, J. B. LLOYD, Wilmington Hall, Dartford, fawn, *Perry Farm Gem*, 3 y., 1 m., 5 d.; bred by J. Le Boutillier, Jersey; s., Pomona's Prince; d., Le Hurd's Lady; s. of d., Carlo:—and LORD ROTHSCHILD, dark fawn, *Belle Marie*, 2 y., 10 m., 6 d.; bred by J. L. Rossignal, St. Brelade's, Jersey; s., Schneider (7238 J.H.B., C.); d., Jolie Marie (6795 F.S.).

CLASS 54.—*Heifer, calved in* 1888. Twenty-four entries.

First Prize, 10*l.*; H. J. CORNISH, Thornford, Sherborne, Dorset, grey, *Lady Derby 3rd*, 2 y., 3 m., 3 d.; bred by S. De La Haye, Jersey; s., Golden Nero (729 J.H.B.); d., Lady Derby 2nd (1903 J.H.B.).

Second Prize, 5*l.*; G. SIMPSON, Wray Park, Reigate, grey fawn, *Pandora 11th*, 2 y., 2 m., 2 w.; s., Friar Grey (2451); d., Pandora 10th; s. of d., Valentine (2126).

Third Prize, 3*l.*; Mrs. A. F. PERKINS, Oak Dene, Holmwood, Surrey, dark grey, *Thistle*, 2 y., 4 m., 1 w.; s. La Ferriere's King (2587); d., Daisy; s. of d., Tommy (1264).

Reserve and Very Highly Commended, J. BRUTTON, 7, Princes Street, Yeovil, light brown, *Mabel 21st*, 2 y., 4 m., 3 w.; bred by W. J. Labey, Grouville, Jersey; s., Sultane's Favourite (vol. ix., 873 J.H.B.); d., Mabel 3rd (179 J.H.B.); s. of d., Sans Peur (201 J.H.B.).

Very Highly Commended, FOWLER and DE LA PERRELLE, Southampton, fawn, *Lily 2nd*, 2 y., 2 m., 3 w.; bred by — Ellhier, Jersey; s. Fortescue (766); d., Lily.—and LORD ROTHSCHILD, Tring Park, Herts, grey and white, *Tulip*, 2 y., 3 m., 2 w., 3 d.; bred by J. P. Marett, Jersey; s., Sultane's Favourite (873 J.H.B.); d., Oxford Daisy (6816 J.H.B.).

Highly Commended, FOWLER and DE LA PERRELLE, fawn, *Jersey Belle*, 2 y., 5 m., 2 d.; bred by C. Falle, Jersey; s., Cotillon (751 J.H.B., P.S.); d., Lady Dauntless; s. of d., Dauntless (403 J.H.B., P.S.):—and LORD ROTHSCHILD, dark grey, *Wigton 2nd*, 1 y., 11 m., 4 w.; bred by A. Gautier, St. Saviour's, Jersey; s., Count Wollesley (928); d., Wigton (7198 F.S.); s. of d., Sir Robert (366 P.S.).

Commended, J. W. CROOKES, Little Testwood, Totton, Hants, fawn, *Rosy's Daisy*, 2 y., 2 m.; bred by J. De Gruchy, St. Mary's, Jersey; s., Rosy's Wonder (835 H.C.); d., Daisy Day (1998 H.C.); s. of d., Lord of the Admiralty (554):—EARL OF DARNLEY, Cobham Hall, Gravesend, solid, *Grannie 3rd*, 1 y., 5 m., 1 w., 5. d; s., Barcaldine; d., Grannie 2nd:—and for his solid, *Wild Bell*, 2 y., 1 m., 2 w., 3 d.; bred by Mrs. Crookes, late of Meopham Court, Gravesend; s., Magnum Bonum (1792); d., Durton Belle; s. of d., Rowley King (1980):—and FOWLER and DE LA PERRELLE, grey, *Hatty 2nd*, 2 y., 3 m., 3 w., 2 d.; bred by J. Romerie, Jersey; s., Highland Lad (845); d., Hatty.

CLASS 55.—*Heifer, calved in* 1889. Twenty-eight entries.

First Prize, 10*l.*; LORD ROTHSCHILD, Tring Park, Herts, fawn, *Miss Rosy*, 1 y., 2 m., 3 w., 5 d.; bred by W. Alexander, jun., St. Mary's, Jersey; s., Rosy's Wonder (835 J.H.B., H.C.P.S.); d., La Mauve 3rd; s. of d., Noble 1st.

Second Prize, 5*l.*; H. J. CORNISH, Thornford, Sherborne, Dorset, brown, *Miranda*, 1 y., 4 m., 4 d.; bred by F. Le Brocq, St. Peter's, Jersey; s., Lord Nelson (900 J.H.B.); d., Slipper (2862 J.H.B.).

Third Prize, 3*l.*; LORD ROTHSCHILD, fawn, *Lily Wale*, 1 y., 2 m., 3 w., 1 d.; bred by W. Jeans, St. Helier's, Jersey; s., Jolly Boy (921); d., Country Lass (F.S.).

Reserve and Very Highly Commended, G. W. HASTINGS, M.P., Barnard's Green House, Great Malvern, fawn, *Fleurette*, 8 m., 2 w., 3 d.; s., Dogmatic (A.X.); d., Fleur de Lis 5th; s. of d., Cetewayo 4th (581 J.H.B.).

Very Highly Commended, Mrs. A. F. PERKINS, Oak Dene, Holmwood, Surrey, fawn, *Jessica*, 1 y., 4 m., 1 w., 6 d.; s., Franciscan (2449); d., Jessie; s. of d., Baron Betchworth:—and Hon. Mrs. C. HOWARD, Dutchlands, Great Missenden, Bucks, whole, *Hesperantha*, 1 y., 1 m., 3 d.; s., Horehound (2522); d., Lady Alice (vol. iv., p. 228); s. of d., Bloomer (1365).

Highly Commended, J. BLYTH, Wood House, Stansted, Essex, fawn, *Rosa Bonheur*, 1 y., 1 w.; s., Atlanta's Duke (E.); d., Bonheur 3rd (imp.);

s. of d., Royal Khedive (2863):—J. R. Corbett, More Place, Betchworth, fawn, *Frisky 3rd*, 1 y., 1 m., 4 d.; s., Franciscan; d., Frisky; s. of d., Tiny:—J. W. Crookes, Little Testwood, Totton, Hants, red fawn, *Rose Light*, 1 y., 4 m., 3 w., 3 d.; s., Bashie's Wonder (929 P.S.); d., Light of Grouville 2nd (1772); s. of d., Dauntless (403):—and G. W. Hastings, M.P., light brown, *Primula*, 8 m., 3 w., 1 d.; s., Dogmatic (A.X.); d., Primrose of Ashantee 2nd; s. of d., Royal Khedive (628 J.H.B.).

Commended, J. Blyth, fawn and white, *Princess du Monde*, 11 m., 2 w.; s., Prince Bobby (1102 J.H.B.); d., Rosamond 2nd (imp.); s. of d., Prince of Waverley (2812):—J. Brutton, 7, Princes Street, Yeovil, fawn, *Rose*, 1 y., 6 d.; s., Dog Fox (2384); d., Baron's Success 2nd (1858 J.H.B.); s. of d., Augurez King (380 J.H.B.):—H. J. Cornish, grey, *Success*, 1 y., 2 w., 1 d.; s., Leonora's Laddie (2601 E.H.B.); d., Six Rues Belle 4th; s. of d., Queenie's Boy (2824 E.H.B.):—and for his grey, *Pearl of Windsor*, 1 y., 4 w., 2 d.; bred by F. Le Brocq, St. Peter's, Jersey; s., Kaiser's Prince (993 J.H.B.); d., Beau Coin 3rd (2702 J.H.B.).

Given by the English Jersey Cattle Society, for the 1st, 2nd, and 3rd best Cow or Heifer in the Jersey classes, eligible for the English Jersey Herd Book, subject to a butter test. Eight entries.

First Prize, Gold Medal; J. W. Crookes, Little Testwood, Totton, Hants, light fawn, *Mazzini's Pride*, 6 y., 11 m., 3 w., 5 d.; bred by J. Du Val, Augurez, St. Peter's, Jersey; s., Mazzini (326 H.C.); d., Autune (3492).

Second Prize, Silver Medal; J. W. Crookes, grey fawn, *Lady Burnett* (7285 H.C.), 6 y., 6 m., 3 w., 5 d.; bred by P. de Gruchy, Trinity, Jersey; s., Conquest (354 P.S.); d., Lady Burnett (5710 H.C.); s. of d., Sir George (212 H.C.).

Third Prize, Bronze Medal; Not awarded.

GUERNSEY.*

Class 56.—*Bull, calved in* 1886 *or* 1887. Four entries.

First Prize, 15*l.*; Express Dairy Co. (Limited), College Farm, Finchley, Middlesex, lemon fawn and white, *Bonnie Laddie* (468), 3 y., 2 m., 1 d.; bred by the late D. O. Le Patourel, Les Quartiers, Guernsey; s., Sterling (157); d., Bonnie Lassie (228 R.G.A.S.); s. of d., Champion (37 R.G.A.S.).

Second Prize, 10*l.*; Sir F. Montefiore, Bart., Worth Park, Crowley, fawn and white, *Black Prince* (291), 3 y., 1 m.; bred by M. Martel, Preel Castel, Guernsey; s., Zanzibar (395 R.G.A.S., P.S.); d., Lily of the Preel (1552 P.S., R.G.A.S.).

Third Prize, 5*l.*; Fowler and De La Perrelle, Southampton, pale red and white, *Advantage* (463 R.G.H.B.), 3 y., 14 m., 2 w., 4 d.; bred by J. Martel, Guernsey; s., Volage (98 R.G.H.B., P.S.); d., Sans Souci (45 R.G.H.B., P.S.).

Reserve and Highly Commended, G. Long, Ogbourne St. Andrew, Marlborough, fawn and white, *Original* (262), 3 y., 7 m., 2 w., 4 d.; bred by G. Williams, Guernsey; s., Master Dick (233 R.G.A.S.); d., Golddrop of Mount Arrivé (997 R.G.A.S.).

Class 57.—*Bull, calved in* 1888. Eight entries.

First Prize, 15*l.*, and Medal; W. A. Glynn, Seagrove, Seaview, Isle of Wight, lemon fawn and white, *Frolic 2nd*, 2 y., 3 m., 2 w., 3 d.; s., Hopeful (25 E.G.H.B.); d., Frisky (357 E.G.H.B).

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* Three Special Prizes of Silver Medals were given by the English Guernsey Cattle Society for the best Bull, Cow and Heifer, in the Guernsey Classes bred in England, and eligible for the English Guernsey Cattle Society's Herd Book.

Second Prize, 10*l.*; LORD MONTAGU, Palace House, Beaulieu, Hants, fawn and white, *Conqueror*, 2 y., 4 m., 1 w., 2 d.; bred by J. Brehant, St. Sampson's, Guernsey; s., Cremona (246 G.H.B.); d., Dimlight (1340 G.H.B.).

Third Prize, 5*l.*; Colonel A. C. MACLEAY, Glasshayes, Lyndhurst, Hants, red and white, *Pepin 4th* (263 E.G.H.B.), 2 y., 3 m., 3 w., 6 d.; s., Pepin 2nd (108 E.G.H.B.); d., Miranda (428 E.G.H.B.).

Reserve and Very Highly Commended, Sir F. A. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Loftus* (248), 2 y., 3 w., 3 d.; bred by H. Long, Swindon; s., Rufus (154); d., Rheta 1st (667).

Highly Commended, W. A. GLYNN, fawn and white, *Policy*, 1 y., 7 m., 2 w.; s., Hopeful (25 E.G.H.B.); d., Honesty (155 E.G.H.B.); s. of d., Bonnie Boy (8 E.G.H.B.):—and HON. MRS. A. BAILLIE HAMILTON, Combs, Suffolk, red, fawn and white, *Sampson*, 1 y., 11 m., 3 w., 4 d.; s., Loyalist (103 E.G.H.B.); d., Dido (349 E.G.H.B.); s. of d., Loyal (37 E.G.H.B.).

Commended, W. J. BECKINGHAM, Upper Ashe, Micheldever, fawn and white, *Playful Lad*, 1 y., 11 m., 2 w., 5 d.; bred by D. Duguernin, St. Andrew's, Guernsey; s., Zanzibar (305 P.S.); d., St. Margaret (1485).

CLASS 58.—*Bull, calved in* 1889. Seventeen entries.

First Prize, 15*l.*; W. S. BAKER, Hill House, Stone, Dartford, Kent, fawn and white, *Sir Bevys* (366 E.G.H.B.), 1 y., 3 m., 4 w., 1 d.; bred by Express Dairy Company, Finchley; s., Sterling (156 E.G.H.B.); d., Beauty of Brentdale (318 R.G.A.S.).

Second Prize, 10*l.*; Colonel A. C. MACLEAY, Glasshayes, Lyndhurst, fawn and white, *Papageno*, 1 y., 3 m., 1 w., 4 d.; bred by C. Barfoot, Lake Bishopstoke; s., Teaser (219 E.G.H.B.); d., Gentrice (561 E.G.H.B.).

Third Prize, 3*l.*; H. S. MORRIS, Pear Tree House, Southampton, fawn and white, *Esquire* (312 E.G.H.B.), 1 y., 1 m., 1 w., 5 d.; s., Claude (298 R.G.H.B.); d., Princess Victoria (1156 E.G.H.B.); s. of d., Presto (14 P.S., R.G.A.S.).

Reserve and Very Highly Commended, EXPRESS DAIRY COMPANY (Limited), College Farm, Finchley, Middlesex, orange fawn and white, *Finchley Lad*, 1 y., 3 m., 2 w.; bred by J. Stephens, Finchley; s., Boulanger (495 R.G.A.S.); d., Mimosa 4th (1123); s. of d., Jimmy des Houard 2nd (167 R.G.A.S.).

Highly Commended, G. LONG, Ogbourne St. Andrew, Marlborough, fawn and white, *El Dorado*, 1 y., 1 m., 1 w., 1 d.; s., Cloth of Gold 17th (87); d., Republican 6th (1163); s. of d., Golden Fleece (214 R.G.A.S.): LORD MONTAGU, Palace House, Beaulieu, Hants, lemon and white, *Cressy*; s., Crown Prince (37 P.S., R.G.A.S.); d., Maysie; s. of d., Ransom 2nd (204 P.S.):—and Sir F. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Lord Worth* (341), 11 m.; s., Archibald (442 P.S., R.G.A.S.); d., Beauty 3rd (1700).

Commended, W. A. GLYNN, Seagrove, Seaview, Isle of Wight, lemon fawn and white, *Surprise*, 11 m., 3 w., 2 d.; s., Surprise; d., Frisky (357 E.G.H.B.):—and Hon. Mrs. A. B. HAMILTON, Combs, Suffolk, fawn and white, *Jesse*, 1 y., 4 m., 5 d.; s., Baron Vauxbelets 2nd (126 E.G.H.B.); d., Jessie 4th (581 E.G.H.B.); s. of d., Loyal (37 E.G.H.B.).

CLASS 59.—*Cow, in-Milk or in-Calf, calved before* 1887. Eleven entries.

First Prize, 15*l.*, and Medal; W. A. GLYNN, Seagrove, Seaview, Isle of Wight, orange fawn and white, *Fairy 2nd* (105 E.G.H.B), 12 y., 1 m., 3 w., 1 d.; s., Honest Tom; d., Fairy 1st; s. of d., Johnny 1st.

Second Prize, 10*l.*; J. C. FORSTER, Clatford Mills, Andover, red and white, *Antona* (980 E.G.H.B.), 4 y., 5 m., 2 w., 3 d.; bred by F. N. Heaume,

Howard's Forest, Guernsey; s., Jemmy des Houards 2nd (167 P.S., R.G.A.S.); d., Cleopatre (766 R.G.A.S.).

Third Prize, 3*l.*; Colonel A. C. MACLEAY, Glasshayes, Lyndhurst, Hants, red and white, *Francisca* (556 E.G.H.B.), 4 y., 1 m., 2 w., 2 d.; s., Pepin (49 E.G.H.B.); d., Fanny (108 E.G.H.B.).

Reserve and Highly Commended, Sir F. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Queen of the Isle* (663), 9 y.; bred by H. Gandesdu, Vale, Guernsey; s., Prince (146 R.G.A.S.); d., Modred (1335 R.G.A.S.).

Commended, W. A. GLYNN, lemon fawn and white, *Flora* (117 E.G.H.B.), 7 y., 10 m., 3 w., 3 d.; s., Billy 4th (7 E.G.H.B.); d., Fairy 2nd (105 E.G.H.B.); s. of d., Honest Tom:—and Hon. Mrs. A. BAILLIE HAMILTON, Combs, Suffolk, red and white, *Polly 2nd*, 6 y., 4 m., 4 w., 1 d.; bred by A. W. de Putron, Pierre, Percée; d., Polly de la Pierre Percée (629 G.H.B.).

CLASS 60.—*Heifer, in-Milk or in-Calf, calved in* 1887. Nine entries.

First Prize, 15*l.*; G. LONG, Ogbourne St. Andrew, Marlborough, orange fawn and white, *Nora 3rd* (875 E.G.H.B.), 3 y., 2 m., 1 w., 4 d.; s., Cloth of Gold 17th (87); d., Nora 2nd (437); s. of d., Dr. Bill (161 R.G.A.S.).

Second Prize, 10*l.*; W. A. GLYNN, Seagrove, Seaview, Isle of Wight, orange fawn and white, *Favourite 9th* (760 E.G.H.B.), 2 y., 11 m., 3 w., 4 d.; s., Hopeful 25th (E.G.H.B.); d., Favourite 4th (111 E.G.H.B.); s. of d., Billy 4th (7 E.G.H.B.).

Third Prize, 3*l.*; EXPRESS DAIRY COMPANY (Limited), College Farm, Finchley, lemon fawn and white, *Swissville Lass* (2434 R.G.A.S.), 3 y., 2 w.; bred by J. A. Ogier, St. Sampson's, Guernsey; s., Sterling (157 E.G.H.B.); d., Camilla (578 R.G.A.S.); s. of d., Premier (31 R.G.A.S.).

Reserve and Highly Commended, Sir F. A. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Laura 3rd*, 2 y., 8 m., 1 w.; s., Sir Francis (155); d., Laura 2nd (838).

Highly Commended, Colonel A. C. MACLEAY, Glasshayes, Lyndhurst, Hants, red, *Frou Frou* (774 E.G.H.B.), 3 y., 1 m., 3 w., 5 d.; s., Pepin (49 E.G.H.B.); d., Fanny (108 E.G.H.B.).

Commended, W. S. BAKER, Hill House, Stone, Dartford, red, *Minah* (1392 E.G.H.B.), 3 y., 1 m., 3 w.; bred by J. Hubert, Mielles, Vale; s., Imperial; d., Minah:—and W. D. TUCKER, 78, High Street, Southampton, pale red and white, *Daisy de Louisville 3rd*, 2 y., 9 m., 1 w.; bred by J. Bailey, Louisville, Guernsey; s., Auguste (351 P.S.); d., Daisy de Louisville (1562 F.S.).

CLASS 61.—*Heifer, calved in* 1888. Ten entries.

First Prize, 10*l.*; EXPRESS DAIRY COMPANY (Limited), College Farm, Finchley, Middlesex, orange fawn, *Lily of Guernsey 3rd*, 2 y., 1 m., 1 w.; bred by W. De La Mare, St. Andrew's, Guernsey; s., Sarago (392 R.G.A.S.); d., Lily of Guernsey (1432 R.G.A.S.).

Second Prize, 5*l.*, and Medal; Colonel A. C. MACLEAY, Glasshayes, Lyndhurst, Hants, orange and white, *Beatrice* (983 E.G.H.B.), 2 y., 4 m., 3 w., 4 d.; s., Pepin 2nd (108 E.G.H.B.); d., Buttercup of the Hall (502 E.G.H.B).

Third Prize, 3*l.*; W. A. GLYNN, Seagrove, Seaview, Isle of Wight, orange fawn and white, *Amelia*, 1 y., 7 m., 2 w., 3 d.; s., Hopeful (25 E.G.H.B.); d., Flora (117 E.G.H.B.); s. of d., Billy 4th (7 E.G.H.B.).

Reserve and Highly Commended, FOWLER and DE LA PERELLE, Southampton, fawn and white, *Minette de Torteville* (3619 G.H.B.), 2 y., 1 m.; bred by J. Jehan, Guernsey.

Highly Commended, Sir F. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Una* (1467), 1 y., 9 m., 1 w., 3 d.; bred by D. Le Chemmant, Guernsey; s., Ransom 3rd (115 G.H.B.); d., Red Rose (996 G.H.B.).

Commended, EXPRESS DAIRY COMPANY (Limited), orange fawn and white, *Sub Rosa 3rd* (22,000 R.G.A.S.), 2 y., 3 w.; bred by N. Cohn, Les Martin's, Guernsey; s., Staperuyder (248 R.G.A.S.); d., Sub Rosa (1584 R.G.A.S.); s. of d., Cloth of Gold 13th (22 P.S., R.G.A.S.):—and Colonel A. C. MACLEAY, lemon and white, *Damsel 2nd* (1015 E.G.H.B.), 2 y., 3 m.; s., Pepin (49 E.G.H.B.); d., Damsel (85 E.G.H.B.).

CLASS 62.—*Heifer, calved in* 1889. Twenty-three entries.

First Prize, 10*l.*; LORD MONTAGU, Palace House, Beaulieu, Hants, lemon and white, *Cushla 2nd* (E.G.H.B., vol. vi.), 1 y., 1 m., 3 w., 3 d.; s., Pepin (108 E.G.H.B.); d., Cushla (517 E.G.H.B.); s. of d., Reginald (224 R.G.A.S.).

Second Prize, 5*l.*; G. LONG, Ogbourne St. Andrew, Marlborough, fawn and white, *Norah 6th*, 10 m., 4 d.; s., Rouge d'Or (208); d., Nora 3rd (875); s. of d., Cloth of Gold 17th (87).

Third Prize, 3*l.*; EXPRESS DAIRY COMPANY (Limited), College Farm, Finchley, Middlesex, orange fawn and white, *Polly 5th*, 10 m., 1 w.; s., Marc Antony; d., Polly 4th (1148); s. of d., Squire of the King's Mills (101 R.G.A.S.).

Reserve and Very Highly Commended, LORD MONTAGU, lemon and white, *Lily du Préel 3rd* (P.S., G.H.B.), 1 y., 1 m., 2 w., 3 d.; bred by B. Martel Préel Catel, Guernsey; s., Claude (375 P.S., G.H.B.); d., Lily du Préel (1552 G.H.B.).

Very Highly Commended, G. LONG, fawn and white, *Nora 5th*, 1 y., 3 m., 1 w., 4 d.; s., Cloth of Gold 17th (87); d., Nora 2nd (437); s. of d., Dr. Bill (161 R.G.A.S.).

Highly Commended, G. LONG, lemon fawn, *Happy Belle 3rd*, 1 y., 5 m., 2 d.; s., Rufus (154); d., Happy Belle (578); s. of d., Vaillant (55 P.S.):—and H. S. MORRIS, Pear Tree House, Southampton, light red and white, *Blackmaid 4th* (1232 E.G.H.B.), 1 y., 2 m., 3 w., 4 d.; s., Norman (198 E.G.H.B.); d., Blackmaid 3rd (712 E.G.H.B.); s. of d., Milcolm (139 P.S., R.G.A.S.).

Commended, EXPRESS DAIRY COMPANY (Limited), orange fawn and white, *Plaisanterie 4th*, 1 y., 1 m.; s., Excelsior 8th (138); d., Plaisanterie 3rd (893); s. of d., Goldfern 2nd (158 G.H.B.):—W. A. GLYNN, Seagrove, Seaview, Isle of Wight, orange fawn and white, *La Belle 2nd*, 1 y., 1 d.; s., Hopeful (25 E.G.H.B.); d., La Belle (15 E.G.H.B.); s. of d., Billy 4th (7 E.G.H.B.):—and Sir F. MONTEFIORE, Bart., Worth Park, Crawley, fawn and white, *Polly du Grand Courtel* (1417), 1 y., 4 m., 2 w.; bred by W. Grand, Courtel, Guernsey; s., Squire of Hill Farm (198 G.H.B.); d., Polly du Grand Courtel 2nd (1090).

ANY BREED.

CLASS 63.—*Dairy Cow, in-Milk, of any Breed or Cross (milking qualities to be especially considered).* Eleven entries.

N.B.—Animals entered in other Classes were eligible to compete in Class 63.)

First Prize, 15*l.*; H. A. BRASSEY, Preston Hall, Aylesford, Kent, reddish fawn, cross-bred, *Daisy 2nd*, 4 y., 8 m., 4 d.; s., Barcaldine (Jersey bull); d., Daisy (Ayrshire cow).

Second Prize, 10*l.*; J. D. WILLIS, Bapton Manor, near Codford, roan Shorthorn, *Fuchsia*, 8 y., 3 m., 3 w.; s., Cæsar (39,532); d., Fair Maid; s. of d., Victor Royal (35,886).

Third Prize, 5*l.*; J. C. FORSTER, Clatford Mills, Andover, red and white, Guernsey, *Antona* (980 E.G.H.B.), 4 y., 5 m., 2 w., 3 d.; bred by F. N. Heaume, Howard's Forest, Guernsey; s., Jemmy des Houards 2nd (167 P.S. R.G.A.S.); d., Cleopatre (766 R.G.A.S.).

SHEEP.

LEICESTER.

CLASS 64.—*Shearling Ram.* Three entries.

First Prize, 10*l.*; R. and G. HARRISON, Underpark, Lealholm, Grosmont, Yorks, 1 y., 2 m., 3 w.

Second Prize, 5*l.*; R. and G. HARRISON, 1 y., 2 m., 3 w.

Reserve, Mrs. PERRY-HERRICK, Beau Manor Park, Loughborough, 1 y., 2 m., 3 w.

CLASS 65.—*Pair of Ram Lambs, dropped in* 1890. One entry.

First Prize, 10*l.*; R. and G. HARRISON, Underpark, Lealholm, Grosmont, Yorks, 11 w.

Second Prize, 5*l.*; No entry.

CLASS 66.—*Pen of Three Shearling Ewes.* Four entries.

First Prize, 10*l.*; R. and G. HARRISON, Underpark, Lealholm, Grosmont, Yorks, 1 y., 2 m., 3 w.

Second Prize, 5*l.*; R. and G. HARRISON, 1 y., 2 m., 3 w.

Reserve and Commended, Mrs. PERRY-HERRICK, Beau Manor Park, Loughborough, 1 y., 2 m., 3 w.

COTSWOLD.

CLASS 67.—*Shearling Ram.* Five entries.

First Prize, 10*l.*; R. SWANWICK, Royal Agricultural College Farm, Cirencester, 1 y., 3 m., 3 w., 1 d.

Second Prize, 5*l.*; R. SWANWICK, 1 y., 3 m., 3 w., 1 d.

Reserve and Commended, G. BAGNALL, Westwell, Burford, Oxon, 1 y., 2 m., 2 w.

CLASS 68.—*Pair of Ram Lambs, dropped in* 1890. Three entries.

First Prize, 10*l.*; R. SWANWICK, Royal Agricultural College Farm, Cirencester, 4 m., 3 w.

Second Prize, 5*l.*; G. BAGNALL, Westwell, Burford, Oxon, 3 m., 2 w.

CLASS 69.—*Pen of Three Shearling Ewes.* Two entries.

First Prize, 10*l.*; G. BAGNALL, Westwell, Burford, Oxon, 1 y., 2 m., 2 w.

Second Prize, 5*l.*; G. BAGNALL, 1 y., 2 m., 3 w.

ROMNEY MARSH OR KENT.

CLASS 70.—*Two Shear Ram.* Eighteen entries.

First Prize, 10*l.*, and Extra Prize, 10*l.*;* F. NEAME, jun., Macknade, Faversham, Kent, 2 y., 3 m.

Reserve and Highly Commended, F. NEAME, jun., 2 y., 3 m.

Highly Commended, W. MILLEN, Syndale Farm, Faversham, Kent, 2 y., 2 m., 1 d.

CLASS 71.—*Shearling Ram.* Twenty-six entries.

First Prize, 10*l.*; H. RIGDEN, Lyminge, Hythe, 1 y., 1 m., 2 w.

Second Prize, 5*l.*; W. MILLEN, Syndale Farm, Faversham, 1 y., 2 m., 4 d.

Reserve and Highly Commended, H. PAGE, Walmer Court, Walmer, 1 y., 3 m.

* Given for the best Ram in Classes 70 and 71.

Commended, F. BAKER, Manor Farm, Frindsbury, Rochester, 1 y., 2 m.: —and F. NEAME, jun., Macknade, Faversham, 1 y., 3 m.

CLASS 72.—*Pair of Ram Lambs, dropped in* 1890. Ten entries.

First Prize, 10*l.*, and Extra Prize, 10*l.*;* H. RIGDEN, Lyminge, Hythe, Kent, 2 m., 2 w.

Second Prize, 5*l.*; F. BAKER, Manor Farm, Frindsbury, Rochester, Kent, 4 m.

Reserve and Commended, F. BAKER, 4 m.

CLASS 73.—*Pen of three Two Shear Ewes suckling their own Lambs.* Four entries.

First Prize, 10*l.*; F. NEAME, jun., Macknade, Faversham, 2 y., 3 m.

Second Prize, 5*l.*; LORD HOTHFIELD, Hothfield Place, Ashford, Kent, 2 y., 3 m.

Reserve and Commended, F. BAKER, Manor Farm, Frindsbury, Rochester, 2 y., 2 m.

CLASS 74.—*Pen of Three Shearling Ewes.* Eleven entries.

First Prize, 10*l.*, and Extra Prize, 10*l.*; † H. RIGDEN, Lyminge, Hythe, Kent, 1 y., 2 m.

Second Prize, 5*l.*; W. MILLEN, Syndale Farm, Faversham, Kent, 1 y., 1 m., 3 w., 4 d.

Reserve and Highly Commended, LORD HOTHFIELD, Hothfield Place, Ashford, 1 y., 3 m.

OTHER LONG-WOOL BREEDS.

CLASS 75.—*Shearling Ram.* Nine entries.

First Prize, 10*l.*; C. NORRIS, Mosshayne, Exeter, a Devon, 1 y., 3 m., 3 w., 2 d.

Second Prize, 5*l.*; C. NORRIS, a Devon, 1 y., 4 m.

Reserve and Commended, A. C. SKINNER, Pound Farm, Bishop's Lydeard, a Devon, 1 y., 4 m., 5 d.

CLASS 76.—*Pair of Ram Lambs, dropped in* 1890. Five entries.

First Prize, 10*l.*; A. C. SKINNER, Pound Farm, Bishop's Lydeard, a Devon, 4 m., 5 d.

Second Prize, 5*l.*; A. C. SKINNER, a Devon, 4 m., 5 d.

Reserve and Highly Commended, Sir J. H. H. AMORY, Bart., Knightshayes Court, Tiverton, a Devon, 4 m.

CLASS 77.—*Pen of Three Shearling Ewes.* Four entries.

First Prize, 10*l.*; Sir J. H. H. AMORY, Bart., Knightshayes Court, Tiverton, a Devon, 1 y., 3 m., 3 w.

Second Prize, 5*l.*; E. R. B. TORR, Westleigh House, Bideford, Devon, a Devon, 1 y., 4 m., 1 d.

Reserve and Highly Commended, C. NORRIS, Mosshayne, Exeter, a Devon, 1 y., 3 m., 1 w.

SOUTHDOWN.

CLASS 78.—*Shearling Ram.* Twenty-three entries.

First Prize, 10*l.*; H.R.H. The PRINCE OF WALES, K.G., Sandringham, Norfolk, 1 y., 3 m.

Second Prize, 5*l.*; PAGHAM HARBOUR COMPANY, Selsey, Chichester, 1 y., 4 m., 4 d.

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* Given for the best pair of Ram Lambs in Class 72.

† Given for the best entry in Classes 73 and 74.

Third Prize, 3*l.*; Sir W. THROCKMORTON, Bart., Buckland, Faringdon, 1 y., 3 m., 1 w., 3 d.

Highly Commended, H.R.H. the PRINCE OF WALES, 1 y., 3 m.:—and W. TOOP, Aldingbourne, Chichester, 1 y., 3 m., 3 w.

Commended, E. ELLIS, Shalford, Guildford, 1 y., 3 m., 3 w.

CLASS 79.—*Pair of Ram Lambs, dropped in* 1890. Fourteen entries.

First Prize, 10*l.*; E. ELLIS, Shalford, Guildford, 3 m., 3 w.

Second Prize, 5*l.*; W. TOOP, Aldingbourne, Chichester, 3 m., 3 w.

Reserve and Highly Commended, H.R.H. The PRINCE OF WALES, K.G., Sandringham, Norfolk, 3 m.

Commended, J. S. HODGSON, Lythe Hill Farm, Haslemere, Surrey, 3 m., 3 w., 5 d.:—and W. TOOP, 3 m., 3 w.

CLASS 80.—*Pen of Three Shearling Ewes.* Thirteen entries.

First Prize, 10*l.*; E. ELLIS, Shalford, Guildford, 1 y., 3 m., 3 w.

Second Prize, 5*l.*; W. TOOP, Aldingbourne, Chichester, 1 y., 3 m., 3 w.

Reserve and Highly Commended, C. LUCAS, Warnham Court, Horsham, 1 y., 2 m., 3 w.

Highly Commended, H.R.H. the PRINCE OF WALES, K.G., Sandringham, Norfolk, 1 y., 3 m.

Commended, H. A. BRASSEY, Preston Hall, Aylesford, 1 y., 3 m., 5 d.

HAMPSHIRE DOWN.

CLASS 81.—*Shearling Ram.* Ten entries.

First Prize, 10*l.*; W. NEWTON, Crowmarsh Battle, Wallingford, 1 y., 4 m., 3 w.

Second Prize, 5*l.*; W. NEWTON, 1 y., 4 m., 3 w.

Reserve and Highly Commended, R. COLES, Middleton, Warminster, *Little Wonder*, 1 y., 4 m., 2 w.

Highly Commended, COLLEGE OF AGRICULTURE, Downton, Salisbury, 1 y., 4 m., 3 w.

Commended, C. and T. COLES, Manor House, Winterbourne Stoke, Salisbury, 1 y., 4 m. about.

CLASS 82.—*Pair of Ram Lambs, dropped in* 1890. Seven entries.

First Prize, 10*l.*; F. R. MOORE, Littlecott, Upavon, Wilts, 4 m., 3 w.

Second Prize, 5*l.*; J. BARTON, Hackwood Farm, Basingstoke, 6 m.

Reserve and Highly Commended, W. NEWTON, Crowmarsh Battle, Wallingford, 4 m., 3 w.

Highly Commended. F. R. MOORE, 4 m., 3 w., 3 d.

Commended, R. COLES, Middleton, Warminster, 4 m., 2 w.

CLASS 83.—*Pen of Three Shearling Ewes.* Three entries.

First Prize, 10*l.*; W. NEWTON, Crowmarsh Battle, Wallingford, 1 y., 4 m., 3 w.

Second Prize, 5*l.*; COLLEGE OF AGRICULTURE, Downton, Salisbury, 1 y., 4 m., 3 w.

Reserve and Highly Commended, C. and T. COLES, Manor House, Winterbourne Stoke, 1 y., 4 m.

SHROPSHIRE.

CLASS 84.*—*Shearling Ram.* Nineteen entries.

First Prize, 10*l.*; W. F. INGE, Thorpe Hall, Tamworth, 1 y., 3 m.

Second Prize, 5*l.*: W. F. INGE, 1 y., 3 m.

* The third and fourth Prizes in Class 84 were given by the Shropshire Sheep Breeders' Association.

Third Prize, 3*l.*; G. Graham, The Oaklands, Birmingham, 1 y., 3 m., 3 w.
4th Prize, 2*l.*; A. E. Mansell, Astol, Shifnal, Salop, 1 y., 3 m.
Reserve and Highly Commended, J. Bowen-Jones, Ensdon House, Montford Bridge, 1 y., 3 m.
Highly Commended, G. Graham, 1 y., 3 m., 3 w.:—J. Howell, Green Farm, Saintwell, near Cardiff, *St. Fagan's*, 1 y., 2 m., 5 d.:—and G. Lewis, Ercall Park, Wellington, Salop, 1 y., 2 m., 4 d.
Commended, R. Brown, Ruyton of the Eleven Towns, Salop, 1 y., 1 m., 3 w., 4 d.:—and E. Nock, Brockton House, Shifnal, Salop, 1 y., 3 m.

Class 85.—*Pair of Ram Lambs, dropped in* 1890. Seven entries.

First Prize, 10*l.*; T. and S. Bradburne, Astwood Hill, Redditch, 3 m.
Second Prize, 5*l.*; W. Thomas, Beam House, Montford Bridge, 3 m. about.
Reserve and Highly Commended, W. F. Inge, Thorpe Hall, Tamworth, 3 m., 2 w.
Highly Commended, R. Brown, Ruyton of the Eleven Towns, Salop, 3 m., 2 w., 3 d.; and 3 m., 1 w., 2 d.
Commended, E. Nock, Brockton House, Shifnal, Salop, 3 m., 1 w.

Class 86.—*Pen of Three Shearling Ewes.* Six entries.

First Prize, 10*l.*; G. Graham, Oaklands, Birmingham, 1 y., 3 m., 1 w., about.
Second Prize, 5*l.*; J. Bowen-Jones, Ensdon House, Montford Bridge, 1 y., 3 m.
Reserve and Highly Commended, W. Thomas, Beam House, Montford Bridge, 1 y., 3 m., about.
Highly Commended, T. and S. Bradburne, Astwood Hill, Redditch, 1 y., 2 m., 3 w., about:—and E. Nock, Brockton House, Shifnal, Salop, 1 y., 3 m.
Commended, G. Lewis, Ercall Park, Wellington, Salop, 1 y., 2 m., 10 d.

OXFORDSHIRE DOWN.

Class 87.—*Shearling Ram.* Three entries.

First Prize, 10*l.*; G. Adams, Royal Prize Farm, Pidnell, Faringdon, 1 y., 4 m., 3 w.
Second Prize, 5*l.*; G. Adams, 1 y., 4 m., 3 w.

Class 88.—*Pair of Ram Lambs, dropped in* 1890. Three entries.

First Prize, 10*l.*; G. Adams, Royal Prize Farm, Pidnell, Faringdon, 4 m., 3 w.
Second Prize, 5*l.*; G. Adams, 4 m., 3 w.
Reserve and Very Highly Commended, R. W. Hobbs, Kelmscott, Lechdale, 4 m., 1 w., about.
Highly Commended, R. W. Hobbs, 4 m. 1 w., about.

Class 89.—*Pen of Five Shearling Ewes.* Two entries.

First Prize, 10*l.*; G. Adams, Royal Prize Farm, Pidnell, Faringdon, 1 y., 4 m., 3 w.
Second Prize, 5*l.*; G. Adams, 1 y., 4 m., 3 w.

SOMERSET AND DORSET HORN.

Class 90.—*Shearling Ram.* Four entries.

First Prize, 10*l.*; Culverwell Brothers, Durleigh Farm, Bridgwater, 1 y., 4 m., 3 w., 1 d.; bred by the late W. T. Culverwell, Bridgwater.

Second Prize, 5*l.*; J. KIDNER, Nynehead, Wellington, Somerset, 1 y., 5 m., 3 w.
Reserve and Highly Commended, J. KIDNER, 1 y., 5 m., 3 w.
Highly Commended, CULVERWELL BROTHERS, 1 y., 4 m., 3 w., 1 d.

CLASS 91.—*Pair of Ram Lambs, dropped after Dec. 1st,* 1889. Two entries.

First Prize, 10*l.*; CULVERWELL BROTHERS, Durleigh Farm, Bridgwater, 5 m., 1 w., 4 d.; bred by the late W. T. Culverwell, Bridgwater.
Second Prize, 5*l.*; J. KIDNER, Nynehead, Wellington, Somerset, 5 m., 3 w.

CLASS 92.—*Pen of Five Shearling Ewes.* Four entries.

First Prize, 10*l.*; CULVERWELL BROTHERS, Durleigh Farm, Bridgwater, 1 y., 4 m., 3 w., 5 d.; bred by the late W. T. Culverwell, Bridgwater.
Second Prize, 5*l.*; J. KIDNER, Nynehead, Wellington, Somerset, 1 y., 5 m., 3 w.
Reserve and Highly Commended, J. KIDNER, 1 y., 5 m., 3 w.
Highly Commended, E. J. STANLEY, M.P., Quantock Lodge, Bridgwater, 1 y., 5 m., 4 d.

MOUNTAIN.

CLASS 93.—*Two-Shear or Shearling Ram.* Four entries.

First Prize, 10*l.*; Sir W. WILLIAMS, Heanton, Barnstaple, an Exmoor, 1 y., 3 m.
Second Prize, 5*l.*; Sir W. WILLIAMS, 1 y., 3 m.
Reserve, E. J. STANLEY, M.P., Quantock Lodge, Bridgwater, an Exmoor, 2 y., 3 m., 4 d.

CLASS 94.—*Pen of Three Shearling Ewes.* Two entries.

First Prize, 10*l.*; E. J. STANLEY, M.P., Quantock Lodge, Bridgwater, Exmoors, 1 y., 3 m., 4 d.
Second Prize, 5*l.*; E. J. STANLEY, M.P., 1 y., 3 m., 4 d.

OTHER SHORT-WOOL BREEDS.

CLASS 95.—*Shearling Ram.* First Prize, 10*l.* Second Prize, 5*l.*

[NO ENTRY.]

CLASS 96.—*Pen of Three Shearling Ewes.* First Prize, 10*l.* Second Prize, 5*l.*

[NO ENTRY.]

PIGS.

BERKSHIRE.

CLASS 97.—*Boar, farrowed in* 1887 *or* 1888. Four entries.

First Prize, 7*l.*; J. MILLS, Bisterne Park, Ringwood, *Oscar*, 3 y., 1 w., 2 d.; bred by J. Saunders, Sutton, Cranborne; s., Sambo; d., Sutton Lass; s. of d., Charlton.
Second Prize, 3*l.*; J. P. KING, North Stoke, Wallingford, *Baron Newport*, 2 y., 6 m., 3 w., 6 d.; s., Samphire 2nd (1209); d., Moulsford 36th (735).

CLASS 98.—*Boar, farrowed in* 1889. Seven entries.

First Prize, 7*l.*; J. A. FRICKER, Burton, Mere, Wilts, 1 y., 3 w., 6 d.; s., Random (1348 B.B.); d., Elsie (1609 B.B.); s. of d., Invincible (1143 B.B.).

Second Prize, 3*l.*; J. P. KING, North Stoke, Wallingford, Berks, 1 y., 4 m., 2 w., 3 d.; s., Tankerville; d., Moulsford 36th (735).

Reserve, N. BENJAFIELD, Short's Green Farm, Motcombe, Shaftesbury, 11 m., 6 d.

CLASS 99.—*Breeding Sow, farrowed before* 1890. Twelve entries.

First Prize, 7*l.*; J. A. FRICKER, Burton, Mere, Wilts, 1 y., 5 m., 3 d.

Second Prize, 3*l.*; N. BENJAFIELD, Short's Green Farm, Motcombe, Shaftesbury, 1 y., 11 m., 4 w., 1 d.

Reserve and Highly Commended, J. P. KING, North Stoke, Wallingford, 1 y., 4 m., 3 w., 3 d.; s., Moulsford's Earl (1210); d., Bedford 13th (71).

Highly Commended, E. BURBIDGE, South Wraxall, Bradford-on-Avon, *Wiseley*, 1 y., 2 m., 3 d.; s., First Class (2239 B.B.); d., Wisdom (1663 B.B.); s. of d., Lord Randolph Churchill (389 B.B.).

Commended, E. BURBIDGE, *Mary Jane*, 1 y., 2 m., 1 w., 4 d.; s., First Class (2239); d., Sister Jane (1664); s. of d., Shaftesbury.

CLASS 100.—*Pen of Two Breeding Sows, farrowed in* 1890. Five entries.

First Prize, 7*l.*; H. A. BRASSEY, Preston Hall, Aylesford, 5 m., 1 d.

Second Prize, 3*l.*; N. BENJAFIELD, Short's Green Farm, Motcombe, Shaftesbury, 4 m., 4 w.

Reserve, J. A. FRICKER, Burton, Mere, Wilts, 5 m., 2 d.; s., King of the West (2181 B.B.); d., Bright 2nd (2136 B.B.); s. of d., Random (1348 B.B.).

SMALL BLACK BREED.

CLASS 101.—*Boar, farrowed in* 1887 *or* 1888. Three entries.

First Prize, 7*l.*; C. E. DUCKERING, The Cliff, Kirton Lindsey, 1 y., 10 m., 4 d.; bred by Earl of Portsmouth, Eggesford, Wembworthy, Devon.

Second Prize, 3*l.*; C. E. DUCKERING, 2 y., 10 m., 3 w.; bred by G. Pettit, Friston, Saxmundham.

Reserve, G. PETTIT, The Firs, Friston, Saxmundham, *Windsor*, 1 y., 11 m., 1 w.; s., Danger; d., Victoria.

CLASS 102.—*Boar, farrowed in* 1889. One entry.

First Prize, 7*l.*; G. PETTIT, The Firs, Friston, Saxmundham, 1 y., 2 w.; s., Danger; d., Pet.

Second Prize, 3*l.*; No entry.

CLASS 103.—*Breeding Sow, farrowed before* 1890. One entry.

First Prize, 7*l.*; G. PETTIT, The Firs, Friston, Saxmundham, 1 y., 3 w., 3 d.; s., Hero; d., Rose.

Second Prize, 3*l.*; No entry.

CLASS 104.—*Pen of Two Breeding Sows, farrowed in* 1890.
First Prize, 7*l.* Second Prize, 3*l.*

[NO ENTRY.]

LARGE WHITE BREED.

Class 105.—*Boar, farrowed in* 1887 *or* 1888. Three entries.

First Prize, 7*l.*; S. Spencer, Holywell Manor, St. Ives, *Holywell Squire 2nd*, 2 y., 5 m., 3 d.; s., Holywell Slit Ear (515); d., Holywell Dame 2nd (1152); s. of d., Smithfield (365).

Second Prize, 3*l.*; The Guardians, Prescot Union, Prescot, *Prince*, 2 y., 9 m., 1 w.; s., Hero; d., Princess (1308); s. of d., Pride of Apperley.

Reserve and Highly Commended, S. Spencer, *Holywell Windsor*, 2 y., 5 m., 1 d.; s., Holywell King (509); d., Holywell Gem (708); s. of d., St. Anthony (357).

Class 106.—*Boar, farrowed in* 1889. Nine entries.

First Prize, 7*l.*; S. Spencer, Holywell Manor, St. Ives, *Holywell Dairyman*, 1 y., 5 m., 2 d.; s., Holywell Doctor (975); d., Holywell Beauty VIII. (1144); s. of d., Holywell King (509).

Second Prize, 3*l.*; S. Spencer, *Holywell Plymouth*, 1 y., 5 m., 2 d.; s., Holywell King (509).

Reserve and Highly Commended, The Guardians, Prescot Union, Prescot, *Prescot 6th*, 10 m., 2 w., 5 d.; s., Ben 3rd; d., Princess; s. of d., Pride of Apperley.

Class 107.—*Breeding Sow, farrowed before* 1890. Five entries.

First Prize, 7*l.*; C. E. Duckering, The Cliff, Kirton Lindsey, 3 y.

Second Prize, 3*l.*; S. Spencer, Holywell Manor, St. Ives, *Holywell Dame 25th*, 2 y., 8 m., 2 w., 1 d.; s., Holywell Smithfield (705); d., Holywell Dame 4th (1156); s. of d., Smithfield (365).

Reserve, The Guardians, Prescot Union, Prescot, *Whiston*, 2 y., 5 m., 5 d.; s., Belper (671); d., Whiston (1342); s. of d., Rainhill.

Class 108.—*Pen of Two Breeding Sows, farrowed in* 1890. Three entries.

First Prize, 7*l.*; S. Spencer, Holywell Manor, St. Ives, Hunts, 5 m., 4 d.; s., Holywell Dairyman 2nd; d., Holywell Flirt; s. of d., Holywell Giant 15th.

Second Prize, 3*l.*; C. E. Duckering, The Cliff, Kirton Lindsey, 5 m., 1 d.

Reserve, T. Strickland, Thirsk Junction, Yorkshire, 4 m., 3 w., 5 d.

MIDDLE WHITE BREED.

Class 109.—*Boar, farrowed in* 1887 *or* 1888. Five entries.

First Prize, 7*l.*; S. Spencer, Holywell Manor, St. Ives, *Holywell Billy*, 2 y., 3 w., 3 d.

Second Prize, 3*l.*; A. C. Twentyman, Castlecroft, near Wolverhampton, *Young Juan*, 1 y., 5 m., 2 w., 1 d.; s., Don Juan (835); d., Tiny (912); s. of d., The Earl (399).

Reserve, C. E. Duckering, The Cliff, Kirton Lindsey, 1 y., 7 m.

Class 110.—*Boar, farrowed in* 1889. Six entries.

First Prize, 7*l.*; S. Spencer, Holywell Manor, St. Ives, *Holywell Bruce*, 1 y., 5 m., 3 d.; s., Holywell Ponfield (1113).

Second Prize, 3*l.*; A. C. Twentyman, Castlecroft, near Wolverhampton, *Silversand*, 11 m., 3 w., 4 d.; s., Silver King (603); d., Tiny (912); s. of d., The Earl (399).

Reserve, A. C. Twentyman, *Quicksilver*, 11 m., 3 w., 4 d.; s., Silver King (603); d., Tiny (912); s. of d., The Earl (399).

CLASS 111.—*Breeding Sow, farrowed before* 1890. Seven entries.

First Prize, 7*l.*; T. STRICKLAND, Thirsk Junction, Yorkshire, about 2½ y.
Second Prize, 3*l.*; S. SPENCER, Holywell Manor, St. Ives, *Holywell Maggs*, 1 y., 5 m., 3 d.; s., Holywell Ponfield (1113).
Third Prize, 3*l.*; S. SPENCER, *Holywell Fiz*, 1 y., 7 m.; s., Holywell Swell (591).

CLASS 112.—*Pen of Two Breeding Sows, farrowed in* 1890. Four entries.

First Prize, 7*l.*; S. SPENCER, Holywell Manor, St. Ives, 4 m., 4 w., 2 d.; s., Holywell Ponfield (1113).
Second Prize, 3*l.*; S. SPENCER, 4 m., 4 w., 2 d.; s., Holywell Ponfield (1113).
Reserve, T. STRICKLAND, Thirsk Junction, Yorkshire, 5 m., 2 d.

SMALL WHITE BREED.

CLASS 113.—*Boar, farrowed in* 1887 *or* 1888. One entry.

First Prize, 7*l.*; Hon. Mrs. MEYNELL-INGRAM, Temple Newsam, Leeds, 3 y., 2 m., 3 w., 6 d.; bred by F. A. Walker Jones, Mollington.
Second Prize, 3*l.*; No entry.

CLASS 114.—*Boar, farrowed in* 1889. Five entries.

First Prize, 7*l.*; THE GUARDIANS, Prescot Union, Prescot, *Bold*, 1 y., 6 m.
Second Prize, 3*l.*; THE GUARDIANS, Prescot Union, *Cronton*, 1 y., 6 m.
Reserve, A. H. SLADE, Castle Hill, Addington, Surrey, *Punch*, 1 y., 5 m., 3 d.; bred by the late Earl of Radnor, Coleshill, Highworth; s., Prince; d., Shrewsbury 3rd (1472); s. of d., Jumbo (621).

CLASS 115.—*Breeding Sow, farrowed before* 1890. Three entries.

First Prize, 7*l.*; Hon. Mrs. MEYNELL-INGRAM, Temple Newsam, Leeds, 1 y., 9 m.
Second Prize, 3*l.*; Hon. Mrs. MEYNELL-INGRAM, 1 y., 9 m.
Reserve, A. H. SLADE, Castle Hill, Addington, Surrey, *Sly Boots*, 2 y., 2 m., 2 w., 6 d.; bred by the late Earl of Radnor, Coleshill, Highworth, Wilts; s., Clanfield (863); d., Shrewsbury 3rd (1472); s. of d., Jumbo (621).

CLASS 116.—*Pen of Two Breeding Sows, farrowed in* 1890. First Prize, 7*l.* Second Prize, 3*l.* One entry.

[NO AWARD.]

HOPS.

CLASS 117.—*Pocket of East Kent Hops.* Two entries.

First Prize, 10*l.*; Extra Prize, 20*l.**; and Champion Prize; E. LENEY, Ensinge House, Maidstone.
Second Prize, 5*l.*; G. P. GIPPS, Howlett, Bekesbourne, Canterbury.

CLASS 118.—*Pocket of Mid Kent Hops.* Six entries.

First Prize, 10*l.*; L. J. W. FLETCHER, Ewell Manor, West Farleigh, Maidstone.
Second Prize, 5*l.*; H. LENEY, Court Lodge, West Farleigh, Kent.

* Given for the best Pocket of Hops in any of the Classes.

CLASS 119.—*Pocket of Weald of Kent Hops.* Three entries.
First Prize, 10*l.*; R. H. BOWMAN, The Grange, Hadlow, Tonbridge.
Second Prize, 5*l.*; F. E. HILLS, Redleaf, Penshurst, Kent.

CHAMPION PRIZE

Given by MESSRS. W. H. *and* H. LE MAY, *for the best Pocket of Hops, without restriction to any particular County, a piece of Plate value* 26*l.* 5*s.*
E. LENEY, Ensinge House, Maidstone.

WOOL.

CLASS 120.—*Three Long-Wool Fleeces of the Clip of* 1890. Twelve entries.

First Prize, 5*l.*; T. WOTTON, Tile Lodge, Sturry, near Canterbury.
Second Prize, 2*l.*; F. NEAME, jun., Macknade, Faversham.
Very Highly Commended, R. and G. HARRISON, Underpark, Lealholm, Grosmont, Yorkshire:—H. RIGDEN, Lyminge, near Hythe:—and T. WOTTON.
Commended, G. W. FINN, Westwood Court, Faversham.

CLASS 121.—*Three Short-Wool Fleeces of the Clip of* 1890. Three entries.

First Prize, 5*l.*; EARL OF DARNLEY, Cobham Hall, Gravesend.
Second Prize, 2*l.*; A. DE MURRIETTA, Wadhurst Park, Wadhurst, Sussex.

CHEESE.

CLASS 122.—*Lot of Four Cheeses (not less than* 70 *lbs. each), made in* 1889. Twelve entries.

First Prize, 20*l.*; T. C. CANDY, Woolcombe, Cattistock, Dorset.
Second Prize, 10*l.*; T. C. CANDY.
Third Prize, 4*l.*; H. FRANCIS, Little Burton, Sherborne.
Fourth Prize, 1*l.*; A. REYNOLDS, Milborne Port, Somerset.
Reserve, T. ALLEN, Crookwood, Devizes.
Highly Commended, A. REYNOLDS.
Commended, J. LODDER, Kingsmill, Marnhull, Blandford, Dorset.

CLASS 123.—*Lot of not less than* 2 *cwt. of Cheese (Truckles excepted), made in* 1890. Seven entries.

First Prize, 10*l.*; H. CANNON, Milton Clevedon, Evercreech.
Second Prize, 5*l.*; T. C. CANDY, Woolcombe, Cattistock, Dorset.
Third Prize, 2*l.*; J. MANFIELD, Hambridge, Curry Rivell, Taunton.
Fourth Prize, 1*l.*; C. W. FRANCIS, South Chefiton, Bath.
Reserve, S. H. PERRY, Shalford Farm, Charlton Musgrove, Wincanton.

CLASS 124.—*Lot of Ten Loaf, or other Truckle Cheeses, any age (not including Stilton).* Three entries.

First Prize, 4*l.*; T. C. CANDY, Woolcombe, Cattistock, Dorset.
Second Prize, 2*l.*; A. REYNOLDS, Milborne Port, Somerset.

CLASS 125.—*Lot of Five Cream or other Soft Cheeses.* Three entries.

First Prize, 2*l.*; E. BROUGH, Wyndgate, near Scarborough.
Second Prize, 1*l.*; T. ALLEN, Crookwood, Devizes.

BUTTER AND CREAM.

CLASS 126.—*Lot of 3 lbs. of Fresh (or very slightly Salted) Butter, in pound plain rolls or brick shapes, made of Cream from Cows other than Channel Island Breeds.* Eighteen entries.

First Prize, 5*l.*; J. WILLIAMS, Regilbury Park, Winford.
Second Prize, 3*l.*; M. J. WILLIAMS, North Hill Farm, Chew Stoke.
Third Prize, 2*l.*; D. LONGWILL, Kendieshill, Linlithgow.
Fourth Prize, 1*l.*; THE DUKE OF MARLBOROUGH, Blenheim Palace, Oxon.
Reserve, Miss A. A. WALKER, Ockington Farm, Dymock, Gloucestershire.
Highly Commended, Miss E. J. BODY, Leigh Hole Farm, Wrington, Somerset.
Commended, Miss M. A. MARSH, Middle Pymore Farm, Bridport, Dorset:—and J. MILLS, Bisterne, Ringwood.

CLASS 127.—*Lot of 3 lbs. of Fresh (or very slightly Salted) Butter, in pound plain rolls or brick shapes, made of Cream from a Dairy in which not more than one-third are Cows of the Channel Island Breeds.* Eleven entries.

First Prize, 4*l.*; J. WILLIAMS, Regilbury Park, Winford.
Second Prize, 2*l.*; M. J. WILLIAMS, North Hill Farm, Chew Stoke.
Third Prize, 1*l.*; LORD MONTAGU, Palace House, Beaulieu, Hants.
Fourth Prize, 10*s.*; CATHEDRAL DAIRY COMPANY, Exeter.
Reserve, J. MILLS, Bisterne, Ringwood.
Highly Commended, Miss E. J. BODY, Leigh Hole Farm, Wrington, Somerset.

CLASS 128.—*Lot of 3 lbs. of Fresh (or very slightly Salted) Butter, in pound plain rolls or brick shapes, made of Cream from Cows of the Channel Island Breeds only.* Thirteen entries.

First Prize, 4*l.*; C. C. TUDWAY, The Cedars, Wells, Somerset.
Second Prize, 2*l.*; Hon. Mrs. C. HOWARD, Dutchlands, Great Missenden, Bucks.
Third Prize, 1*l.*; J. WILLIAMS, Regilbury Park, Winford.
Fourth Prize, 10*s.*; THE DUKE OF MARLBOROUGH, Blenheim Palace, Oxon.
Reserve, H. J. MIREHOUSE, St. George's Hill, Easton in Gordano, Somerset.
Highly Commended, LORD MONTAGU, Palace House, Beaulieu, Hants:—and M. J. WILLIAMS, North Hill Farm, Chew Stoke.

CLASS 129.—*Lot of 12 lbs. of Salted Butter, in a jar or crock, to be delivered to the Secretary four weeks before the Show.* Ten entries.

First Prize, 4*l.*; M. J. WILLIAMS, North Hill Farm, Chew Stoke.
Second Prize, 2*l.*; J. WILLIAMS, Regilbury Park, Winford.
Third Prize, 1*l.*; J. CHANNON, Wishford, Broadclyst, Exeter.
Fourth Prize, 10*s.*; N. TODD, Okeford Fitzpaine, Blandford, Dorset.
Reserve, J. BRUTTON, 7, Princes Street, Yeovil.

CLASS 130.—*Lot of Four Half Pounds of Clotted or Devonshire Cream, packed either in tins or earthen jars.* Six entries.

First Prize, 2*l.*; J. WILLIAMS, Regilbury Park, Winford.
Second Prize, 1*l.*; W. BEER, Trinity Street, Barnstaple.
Third Prize, 10*s.*; Hon. Mrs. BAILLIE HAMILTON, Combs, Suffolk.

BUTTER-MAKING COMPETITIONS.

(Not open to Makers or Vendors of Churns or their Assistants.)

CLASS 131.*—*Best and largest quantity of Butter, made from a given quantity of Cream, in the cleanest and most approved style, on the first day of the Show.* Nineteen entries.

First Prize, 4*l.*; L. CLASSEY, Lottisham, Glastonbury.

Second Prize, 2*l.*; Miss A. W. RUTHERFORD, Wishanger Manor Farm, Churt, Farnham, Surrey.

Third Prize, 1*l.*; Miss EVANS, Bolton Moor, Manorbier, Pembroke.

Fourth Prize, 10*s.*; Miss E. WRIGHT, Grove Farm, Ashow, Kenilworth.

Reserve and Very Highly Commended, Miss L. SHERBORNE, Chelwood, Bristol.

Highly Commended, Miss A. M. LENTHALL, Belshay Farm, Bridport, Dorset:—Miss M. A. MARSH, Middle Pymore Farm, Bridport, Dorset:—Mrs. E. NEVELL, Forest Hill Manor, Oxford:—and Miss E. M. NEVELL, Forest Hill Manor, Oxford.

Commended, Mrs. S. CROOK, Dairy Farm, Mentmore, Leighton Buzzard:—E. W. TATLER, Ealing Dean Dairy, Ealing, Middlesex:—Miss A. A. WALKER, Ockington Farm, Dymock, Gloucestershire:—and Miss F. L. WEAVER, Howe Grove Farm, Nempnett, near Wrington.

CLASS 132.—*Best and largest quantity of Butter, made from a given quantity of Cream, in the cleanest and most approved style, on the second day of the Show, open to any woman, without restriction.* Twenty-nine entries.

First Prize, 4*l.*; Mrs. M. J. WILLIAMS, Regilbury Park, Winford.

Second Prize, 2*l.*; Miss F. L. WEAVER, Howe Grove Farm, Nempnett, near Wrington.

Third Prize, 1*l.*; Miss R. SHERBORNE, Chelwood, Bristol.

Fourth Prize, 10*s.*; Miss A. A. WEAVER, Nempnett, Bristol.

Reserve and Highly Commended, Miss A. ROBERTS, Wiston, Steyning, Sussex.

Highly Commended, Miss M. BROWN, Failand, Bristol:—Mrs. S. CROOK, Dairy Farm, Mentmore, Leighton Buzzard:—Miss A. M. LENTHALL, Belshay Farm, Bridport, Dorset:—Miss M. A. MARSH, Middle Pymore Farm, Bridport, Dorset:—and Mrs. BROWN, Wiston, Steyning, Sussex.

Commended, Miss MARY LEWIS, Llandgwynett, Pembroke:—and Mrs. E. WALKER, Great Wellcomes Farm, Kenley, R.S.O.

CLASS 133.—*Best and largest quantity of Butter, made from a given quantity of Cream in the cleanest and most approved style, on the third day of the Show, open to any man or woman, except the winner of the 1st Prize in Class* 132. Thirty-one entries.

First Prize, 4*l.*; Miss A. WILLIAMS, Chew Stoke, near Bristol.

Second Prize, 2*l.*; L. CLASSEY, Lottisham, Glastonbury.

Third Prize, 1*l.*; Miss A. ROBERTS, Wiston, Steyning, Sussex.

Fourth Prize, 10*s.*; Miss MARY LEWIS, Llandgwynett, Pembroke.

Reserve and Very Highly Commended, Miss F. L. WEAVER, Howe Grove Farm, Nempnett, Wrington.

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* Limited to students who have attended a course of instruction at any of the Society's Dairy Schools.

Highly Commended, Miss M. Brown, Failand, Bristol:—Miss A. Haddon, Maxstoke, Coleshill, Warwickshire:—Miss A. M. Lenthall, Belshay Farm, Bridport:—Miss L. Sherborne, Chelwood, Bristol:—Miss A. A. Walker, Ockington Farm, Dymock, Gloucestershire:—Miss A. A. Weaver, Nempnett, Bristol:—Miss E. Wright, Grove Farm, Ashow, Kenilworth:—Mrs. Brown, Wiston, Steyning, Sussex:—and Miss R. Sherborne, Chelwood, Bristol.

Commended, Miss H. M. Joseph, Woodhouse, Stanstead, Essex:—Miss M. A. Marsh, Middle Pymore Farm, Bridport, Dorset:—Miss E. M. Nevell, Forest Hill Manor, Oxford:—Mrs. E. Nevell, Forest Hill Manor, Oxford:—Miss E. M. Bird, Thurleston-cum-Whitton, Ipswich:—Miss A. Carter, Wiston, Steyning, Sussex:—Miss C. Dumbrell, Wiston, Steyning, Sussex:—Miss E. E. Fritchley, Sweet Home, Austerfield, Bawtry, Yorks:—Mrs. E. Walker, Great Welcomes Farm, Kenley, R.S.O.:—Miss J. Wells, Stoke Place Farm, Slough, Bucks:—and Miss Evans, Bolton Farm, Manorbier, Pembroke.

Class 134.—*Best and largest quantity of Butter, made from a given quantity of Cream, in the cleanest and most approved style, on the fourth day of the Show, open to any man or woman, except the winners of the 1st Prizes in Classes* 132 *and* 133. Thirty-two entries.

First Prize, 2*l.* 10*s.*; L. Classey, Lottisham, Glastonbury:—and 2*l.* 10*s.*; Miss H. M. Joseph, Woodhouse, Stanstead, Essex (equal).

Third Prize, 1*l.*; Miss M. A. Marsh, Middle Pymore Farm, Bridport, Dorset.

Fourth Prize, 10*s.*; Miss A. Roberts, Wiston, Steyning, Sussex.

Reserve and Very Highly Commended, Miss Evans, Bolton Farm, Manorbier, Pembroke.

Highly Commended, Miss L. Sherborne, Chelwood, Bristol:—Miss F. L. Weaver, Howe Grove Farm, Nempnett, near Wrington:—Miss E. Wright, Grove Farm, Ashow, Kenilworth:—Miss E. M. Bird, Thurleston-cum-Whitton, Ipswich:—Mrs. Brown, Wiston, Steyning, Sussex:—Miss R. Sherborne, Chelwood, Bristol:—and Mrs. E. Walker, Great Wellcomes Farm, Kenley, R.S.O.

Commended, Miss A. A. Walker, Ockington Farm, Dymock, Gloucestershire:—Miss A. A. Weaver, Nempnett, Bristol:—Miss Mary Lewis, Llandgwynett, Pembroke:—J. S. Latham, 60, Museum Street, London:—and J. Walker, Great Wellcomes Farm, Kenley, R.S.O.

CHAMPION PRIZES.

Competed for on the fifth day of the Show by the winners of Prizes in Classes 131, 132, 133 *and* 134.

First Prize, a Gold Medal and Certificate; Mr. L. Classey, Lottisham, Glastonbury.

Second Prize, a Silver Medal and Certificate; Mrs. M. J. Williams, Regilbury Park, Winford, Somerset.

Third Prize, a Bronze Medal and Certificate; Miss A. A. Weaver, Nempnett, Bristol.

Reserve and Very Highly Commended, Miss Evans, Bolton Farm, Manorbier, Pembroke.

CONSOLATION COMPETITION.

First Prize, 1*l.* 5*s.*; Mrs. E. Walker, Great Wellcomes Farm, Kenley, R.S.O.

Second Prize, 1*l.*; Miss M. Brown, Failand, Bristol.

Third Prize, 15*s.*; Miss A. HADDON, Maxstoke, Coleshill, Warwickshire:—and Miss L. SHERBORNE, Chelwood, Bristol.

Fourth Prize, 10*s.*; Mrs. E. NEVELL, Forest Hill Manor, Oxford:—E. W. TATLER, Ealing Dean Dairy, Middlesex:—Miss A. A. WALKER, Ockington Farm, Dymock, Gloucestershire:—Miss A. M. LENTHALL, Belshay Farm, Bridport:—and Miss A. CARTER, Wiston, Steyning.

Fifth Prize, 5*s.*; Miss E. M. NEVELL, Forest Hill Manor, Oxford:—Miss E. M. BIRD, Thurleston-cum-Whitton, Ipswich:—Mrs. BROWN, Wiston, Steyning:—Miss C. DUMBRELL, Steyning, Sussex:—Miss E. E. FRITCHLEY, Sweet Home, Austerfield, Bawtry, Yorks:—and Miss J. WELLS, Stoke Plain Farm, Slough.

DAIRY APPLIANCES.

(In deciding upon the merits of the Exhibits in Classes 135 and 136, the following points were specially considered:—Efficiency; simplicity in working; price; and suitability for use on small as well as large farms).

CLASS 135.—*Best Appliance for determining the amount of Butter Fat in Milk.— Prize, a Gold Medal.*

[NO AWARD].

CLASS 136.—*Best Appliance for testing the Acidity in Milk.—Prize, a Gold Medal.*

[NO AWARD.]

HORSE-SHOEING COMPETITION.

CLASS 137.—*Best Shoeing of a Nag Horse by a Smith in the Show Yard on the third day of the Show.* Twenty-nine entries.

Certificates of Commendation also awarded where deserved; and a set of models for shoeing to each winner of a Prize or Commendation.

First Prize, 3*l.* 3*s.*; W. DENNER, jun., Pound Square, Cullompton.
Second Prize, 2*l.* 2*s.*; W. B. BLACKALL, Cane End, near Reading.
Third Prize, 1*l.* 1*s.*; E. DAVIES, 47, Castle Street, Merthyr Tydvil.
Highly Commended, G. CRUTTENDEN, sen., care of E. Ebbett, Rochester:—W. DENNER, sen., Pound Square, Cullompton:—and W. STREATFIELD, 41, Russell Road, Wimbledon.

PRESERVED FRUIT AND FRUIT-PACKING APPLIANCES.

CLASS 138.—*Collection of Jams, made in* 1889 *from British Fruit, of not less than Five kinds.* One entry.

First Prize, 3*l.*; J. TRANTOM, Cheapside, Liverpool.
Second Prize, 2*l.*; No entry.

CLASS 139.—*Collection of Jellies, made in* 1889 *from British Fruit, of not less than Three kinds.* First Prize, 3*l.* Second Prize, 2*l.*

[NO ENTRY.]

CLASS 140.—*Collection of British Fruit, bottled in* 1889, *of not less than Five kinds.* First Prize, 3*l.* Second Prize, 2*l.*

[NO ENTRY.]

CLASS 141.—*Collection of Dried or Evaporated British Fruit, of not less than Three kinds, for Cooking purposes.* First Prize, 3*l.* Second Prize, 2*l.*

[NO ENTRY.]

CLASS 142.—*Best Method of Packing Fruit for Market, illustrated by a Package containing not less than* 12 *lbs. of Fruit of any kind.* One entry.

First Prize, 3*l.*; H. A. BRASSEY, Preston Hall, Aylesford.
Second Prize, 2*l.*; No entry.

CLASS 143.—*Best Method of Packing Fruit for the Parcels Post, illustrated by a Package of Fruit not over* 11 *lbs. in weight.* One entry.

First Prize, 3*l.*; H. A. BRASSEY, Preston Hall, Aylesford.
Second Prize, 2*l.*; No entry.

ROCHESTER MEETING, 1890.

Award of Prizes for Poultry.

Stewards.—R. H. Bush: E. J. Sanders: C. L. F. Edwards.

Judges.—J. Dixon, North Park, Clayton, Bradford; W. B. Tegetmeier, 346, Strand, London.

Abbreviations used.—y., year; m., month; w., week.

Section I.—GENERALLY USEFUL BREEDS.

Class 1.—COCHIN (Cinnamon and Buff) COCKS. 6 entries.

First Prize, 1*l.* 10*s.*; Mrs. S. R. Harris, buff.
Second Prize, 15*s.*; W. Cannan, buff.
Third Prize, 5*s.*; Mrs. Scriven, buff, 2 y.
Highly Commended, A. E. W. Darby, buff, over 1 y.

Class 2.—COCHIN (Cinnamon and Buff) HENS. 3 entries.

First Prize, 1*l.* 10*s.*; Mrs. S. R. Harris, buff.
Second Prize, 15*s.*; W. Cannan, buff.
Third Prize, 5*s.*; Mrs. S. R. Harris, buff.

Class 3.—COCHIN (Partridge-Feathered or White) COCKS. 6 entries.

First Prize, 1*l.* 10*s.*; R. Holland, partridge, 2 y.
Second Prize, 15*s.*; H. Tomlinson, 2 y.
Third Prize, 5*s.*; Proprietors, Hawkhurst Poultry Yard, white, 3 y.
Very Highly Commended, G. H. Wood, partridge, various.
Highly Commended, C. P. Wellington, partridge, 1½ y.

Class 4.—COCHIN (Partridge-Feathered or White) HENS. 2 entries.

First Prize, 1*l.* 10*s.*; Rev. R. S. S. Woodgate, white, over 1 y.
Second Prize, 15*s.*; R. Holland, partridge. 2 y.

Class 5.—BRAHMA (Dark) COCKS. 7 entries.

First Prize, 1*l.* 10*s.*; R. Holland, 2 y.
Second Prize, 15*s.*; J. C. Warren, 2 y.
Third Prize, 5*s.*; S. W. Thomas, over 1 y.
Highly Commended, W. Cannan.

Class 6.—BRAHMA (Dark) HENS. 4 entries.

First Prize, 1*l.* 10*s.*; W. Cannan.
Second Prize, 15*s.*; J. Brooke.
Third Prize, 5*s.*; R. Holland, 20 m.

Class 7.—BRAHMA (Light) COCKS. 8 entries.

First Prize, 1*l.* 10*s.*; G. H. Wood, various.
Second Prize, 15*s.*; E. Scammell, 2½ y.
Third Prize, 5*s.*; Miss Hewitt, 2 y.
Highly Commended, R. Corbet, over 1 y.

CLASS 8.—BRAHMA (LIGHT) HENS. 8 entries.

First Prize, 1*l.* 10*s.*; J. BROOKE.
Second Prize, 15*s.*; E. SCAMMELL, 2 y.
Third Prize, 5*s.*; G. H. WOOD, various.
Very Highly Commended, R. CORBET, over 1 y.
Highly Commended, Mrs. T. J. SMITH, 1½ y.

CLASS 9.—LANGSHAN COCKS. 12 entries.

First Prize, 1*l.* 10*s.*; Rev. G. T. LAYCOCK.
Second Prize, 15*s.*; G. FIELDER, 14 m.
Third Prize, 5*s.*; Rev. G. T. LAYCOCK.
Very Highly Commended, W. ROGERS, 12½ m.; C. SEABROOKE, over 1 y.
Highly Commended, T. LAMBERT, 1 y.; G. E. LOCKYEAR, 14 m.

CLASS 10.—LANGSHAN HENS. 8 entries.

First Prize, 1*l.* 10*s.*; C. SEABROOKE, over 1 y.
Second Prize, 15*s.*; G. FIELDER, 13 m.
Third Prize, 5*s.*; Rev. G. T. LAYCOCK.
Highly Commended, Rev. G. T. LAYCOCK; W. H. PACKHAM, 14 m.

CLASS 11.—PLYMOUTH ROCK COCKS. 7 entries.

First Prize, 1*l.* 10*s.*; J. WHEELER, 1889.
Second Prize, 15*s.*; S. LAKE, over 1 y.
Third Prize, 5*s.*; F. W. CHAMPNEYS, 13 m.

CLASS 12.—PLYMOUTH ROCK HENS. 4 entries.

First Prize, 1*l.* 10*s.*; J. WHEELER, 1889.
Second Prize, 15*s.*; S. W. THOMAS, over 1 y.
Third Prize, 5*s.*; J. SANDERCOCK, over 1 y.

CLASS 13.—WYANDOTTE COCKS. 2 entries.

First Prize, 1*l.* 10*s.*; Miss E. LUTTRELL, *golden*, 1888.
Second Prize, 15*s.*; C. SEABROOKE, over 1 y.

CLASS 14.—WYANDOTTE HENS. 3 entries.

First Prize, 1*l.* 10*s.*; F. B. PARROTT, 15 m.
Second Prize, 15*s.*; C. SEABROOKE, over 1 y.
Third Prize, 5*s.*; Mrs. E. OLIVER, *silver laced*, over 1 y.

CLASS 15.—CHICKENS OF 1890 (COCHIN, BRAHMA, LANGSHAN, PLYMOUTH ROCK, or WYANDOTTE), COCKERELS. 8 entries.

First Prize, 1*l.* 10*s.*; R. HOLLAND, 1890.
Second Prize, 15*s.*; Mrs. T. L. FRENCH, *Langshan*, 5 m.
Third Prize, 5*s.*; G. H. WOOD, *Partridge Cochin.*
Highly Commended, P. L. BENSON, M.D., *dark Brahma*, 5 m.; EAST KENT POULTRY FARM, *Plymouth Rock*, 18 w.; W. H. PACKHAM, *Langshan*, 4 m., 3 w.

CLASS 16.—CHICKENS OF 1890 (COCHIN, BRAHMA, LANGSHAN, PLYMOUTH ROCK, or WYANDOTTE). PULLETS.—8 entries.

First Prize, 1*l.* 10*s.*; J. BROOKE, 5 m.
Second Prize, 15*s.*; EAST KENT POULTRY FARM, 18 w.
Third Prize, 5*s.*; C. J. WARREN, *dark Brahma*, 6 m.
Highly Commended, EAST KENT POULTRY FARM, *Plymouth Rock*, 18 w.; J. WHEELER, *Plymouth Rock*, Feb. 21st, 1890; R. HOLLAND, 1890.

SECTION II.—LAYING OR NON-SITTING BREEDS.

CLASS 17.—SPANISH COCKS. 6 entries.

First Prize, 1*l.* 10*s.*; S. T. NASH, 13 m.
Second Prize, 15*s.*; F. WILKINSON, 1 y.
Third Prize, 5*s.*; E. SKINNER, 15 m.
Highly Commended, J. POWELL.

CLASS 18.—SPANISH HENS. 8 entries.

First Prize, 1*l.* 10*s.*; S. T. NASH, 1 y.
Second Prize, 15*s.*; J. POWELL.
Third Prize, 5*s.*; R. P. WHEADON, 1 y., 2 m.
Very Highly Commended, F. WILKINSON, 1 y.
Highly Commended, E. SKINNER, over 1 y.; J. C. WARREN, 1 y.

CLASS 19.—MINORCA COCKS. 6 entries.

First Prize, 1*l.* 10*s.*; A. G. PITTS, 13 m.
Second Prize, 15*s.*; F. F. BRIDLE.
Third Prize, 5*s.*; A. LEWIS.
Highly Commended, A. G. PITTS, 13 m.
Commended, W. CANNAN.

CLASS 20.—MINORCA HENS. 8 entries.

First Prize, 1*l.* 10*s.*; A. LEWIS.
Second Prize, 15*s.*; A. LEWIS.
Third Prize, 5*s.*; E. SKINNER, 15 m.
Commended, A. G. PITTS, 13 m.; A. BODEN, 3 y.

CLASS 21.—LEGHORN (ANY VARIETY) COCKS. 8 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. HURST, *brown*, 1889.
Third Prize, 5*s.*; A. BREINNER, *brown*, over 1 y.
Highly Commended, J. PRIDE, 1 y.; L. C. VERREY, 1889.

CLASS 22.—LEGHORN (ANY VARIETY) HENS. 5 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; R. LITTLE, *white*, 13 m.
Third Prize 5*s.*; J. PRIDE, 1 y.
Commended, L. C. VERREY.

CLASS 23.—HOUDAN COCKS. 2 entries.

First Prize, 1*l.* 10*s.*; Mrs. T. ALDWORTH, 1888.
Second Prize, 15*s.*; S. W. THOMAS, over 1 y.

CLASS 24.—HOUDAN HENS. 3 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; S. W. THOMAS, over 1 y.
Third Prize, 5*s.*; Mrs. T. ALDWORTH, over 1 y.

CLASS 25.—POLISH FOWL, COCKS. 3 entries.

First Prize, 1*l.* 10*s.*; A. SMITH.
Second Prize, 15*s.*; W. CANNAN.
Third Prize, 5*s.*; J. RAWNSLEY.

CLASS 26.—POLISH FOWL, HENS. 2 entries.

First Prize, 1*l.* 10*s.*; J. RAWNSLEY.
Second Prize, 15*s.*; W. CANNAN.

CLASS 27.—HAMBURG (GOLDEN SPANGLED) COCKS. 2 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. RAWNSLEY.

CLASS 28.—HAMBURG (GOLDEN SPANGLED) HENS. 3 entries.

First Prize, 1*l.* 10*s.*; J. RAWNSLEY.
Second Prize, 15*s.*; Mrs. S. R. HARRIS.
Third Prize, 5*s.*; W. CANNAN.

CLASS 29.—HAMBURG (SILVER SPANGLED) COCKS. 4 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. RAWNSLEY.
Third Prize, 5*s.*; H. PICKLES.
Highly Commended, Mrs. S. R. HARRIS.

CLASS 30.—HAMBURG (SILVER SPANGLED) HENS. 4 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; Mrs. S. R. HARRIS.
Third Prize, 5*s.*; J. RAWNSLEY.

CLASS 31.—HAMBURG (GOLDEN PENCILLED) COCKS. 4 entries.

First Prize, 1*l.* 10*s.*; H. PICKLES.
Second Prize, 15*s.*; W. CANNAN.
Third Prize, 5*s.*; E. BIGG, 14 m.
Highly Commended, J. RAWNSLEY.

CLASS 32.—HAMBURG (GOLDEN PENCILLED) HENS. 4 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. RAWNSLEY.
Third Prize, 5*s.*; H. PICKLES.

CLASS 33.—HAMBURG (SILVER PENCILLED) COCKS. 3 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; H. PICKLES.
Third Prize, 5*s.*; J. RAWNSLEY.

CLASS 34.—HAMBURG (SILVER PENCILLED) HENS. 4 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. RAWNSLEY.
Third Prize, 5*s.*; H. PICKLES.

CLASS 35.—HAMBURG (BLACK) COCKS. 10 entries.

First Prize, 1*l.* 10*s.*; W. CANNAN.
Second Prize, 15*s.*; J. D. AMBROSE, 1889.
Third Prize, 5*s.*; J. RAWNSLEY.
Very Highly Commended, Rev. G. T. LAYCOCK.
Highly Commended, Lady H. SOMERSET.

CLASS 36.—HAMBURG (BLACK) HENS. 8 entries.

First Prize, 1*l.* 10*s.*; R. P. INSALL, 14 m.
Second Prize, 15*s.*; J. D. AMBROSE, 1889.
Third Prize, 5*s.*; H. PICKLES.
Very Highly Commended, C. D. BOSWELL, 15 m.; W. CANNAN; J. RAWNSLEY; Lady H. SOMERSET.
Highly Commended, Rev. G. T. LAYCOCK.

CLASS 37.—CHICKENS OF 1890 (SPANISH, MINORCA, LEGHORN, HOUDAN, POLISH, OR HAMBURG)—COCKERELS. 11 entries.

First Prize, 1*l.* 10*s.*; Mrs. T. ALDWORTH, *Houdan*, January, 1890.
Second Prize, 15*s.*; T. RYMAN, *Hamburg*, 4 m.
Third Prize, 5*s.*; G. F. HIGGINSON, *Leghorn*, 3½ m.
Highly Commended, W. BRIDEN, *Spanish*, 4 m.

CLASS 38.—CHICKENS OF 1890 (SPANISH, MINORCA, LEGHORN, HOUDAN, POLISH, OR HAMBURG)—PULLETS. 7 entries.

First Prize, 1*l.* 10*s.*; PROPRIETORS, HAWKHURST POULTRY YARD, *Minorca*, 21 w.
Second Prize, 15*s.*; Mrs. T. ALDWORTH, *Houdan*, January, 1890.
Third Prize, 5*s.*; J. PRIDE, *Leghorn*, 5 m.

SECTION III.—BREEDS SUITABLE FOR THE TABLE.

CLASS 39.—DORKING (COLOURED) COCKS. 5 entries.

First Prize, 1*l.* 10*s.*; R. CHEESMAN, 2 y.
Second Prize, 15*s.*; C. RATCLIFFE, 12 m.
Third Prize, 5*s.*; F. B. MERCER, over 1 y.
Commended, EARL OF DARNLEY, 2 y.

CLASS 40.—DORKING (COLOURED) HENS. 5 entries.

First Prize, 1*l.* 10*s.*; R. CHEESMAN, 3 y.
Second Prize, 15*s.*; EARL OF DARNLEY, 13 m., 2 w.
Third Prize, 5*s.*; C. RATCLIFFE, over 1 y.

CLASS 41.—DORKING (SILVER GREY) COCKS. 9 entries.

First Prize, 1*l.* 10*s.*; J. BLUNDELL, 2 y.
Second Prize, 15*s.*; C. RATCLIFFE, 18 m.
Third Prize, 5*s.*; O. E. CRESSWELL, over 1 y.
Highly Commended, J. E. PILGRIM, 1 y.; A. C. MAJOR.

CLASS 42.—DORKING (SILVER GREY) HENS. 10 entries.

First Prize, 1*l.* 10*s.*; G. T. WHITFIELD.
Second Prize, 15*s.*; E. BARNES, 1889.
Third Prize, 5*s.*; J. BLUNDELL, 2 y.
Highly Commended, F. PLUMPTRE, 1 y.; Mrs. WACHER, 1888 (twice).

CLASS 43.—DORKING (WHITE OR CUCKOO) COCKS. 8 entries.

First Prize, 1*l.* 10*s.*; A. E. W. DARBY, *white*, over 1 y.
Second Prize, 15*s.*; Rev. R. S. S. WOODGATE, *white*, over 1 y.
Third Prize, 5*s.*; O. E. CRESSWELL, *white*, over 1 y.
Highly Commended, R. C. HARRISSON, *white*.

CLASS 44.—DORKING (WHITE OR CUCKOO) HENS. 6 entries.

First Prize, 1*l.* 10*s.*; R. C. HARRISSON, *white.*
Second Prize, 15*s.*; O. E. CRESSWELL, *white,* over 1 y.
Third Prize, 5*s.*; J. E. PILGRIM, *white,* over 1 y.
Highly Commended, O. E. CRESSWELL, *white,* over 1 y.

CLASS 45.—GAME (BLACK-BREASTED REDS) COCKS. 9 entries.

First Prize, 1*l.* 10*s.*, and Champion Prize, 3*l.*;* C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; W. J. PALMER, over 1 y.
Third Prize, 5*s.*; Major A. TERRY, 14 m.
Highly Commended, S. MATTHEW, 17 m.; W. J. PALMER, over 1 y.

CLASS 46.—GAME (BLACK-BREASTED REDS) HENS. 9 entries.

First Prize, 1*l.* 10*s.*; C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; C. W. BRIERLEY, over 1 y.
Third Prize, 5*s.*; Major A. TERRY, 14 m.
Very Highly Commended, C. and E. JACKSON BROTHERS, over 1 y.; W. J. PALMER, over 1 y.
Highly Commended, W. J. PALMER, over 1 y.

CLASS 47.—GAME (BROWN-BREASTED REDS) COCKS. 5 entries.

First Prize, 1*l.* 10*s.*; C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; C. W. DYAS.
Third Prize, 5*s.*; G. F. WARD.
Highly Commended, F. WARDE; G. F. WARD.

CLASS 48.—GAME (BROWN-BREASTED REDS) HENS. 8 entries.

First Prize, 1*l.* 10*s.*; C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; Major A. TERRY, 14 m.
Third Prize, 5*s.*; S. MATTHEW, 17 m.
Very Highly Commended, C. W. BRIERLEY, over 1 y.
Highly Commended, J. C. HUXTABLE, over 1 y.

CLASS 49.—GAME (PILE OR ANY OTHER VARIETY) COCKS. 9 entries.

First Prize, 1*l.* 10*s.*; C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; S. MATTHEW, *Pile,* 13 m.
Third Prize, 5*s.*; C. J. SOTHCOTT, *Duckwing,* 3 y., 3 m.
Highly Commended, H. S. HALL, 15 m.

CLASS 50.—GAME (PILE OR ANY OTHER VARIETY) HENS. 7 entries.

First Prize, 1*l.* 10*s.*; C. W. BRIERLEY, over 1 y.
Second Prize, 15*s.*; C. and E. JACKSON BROTHERS, over 1 y.
Third Prize, 5*s.*; C. W. BRIERLEY, over 1 y.
Highly Commended, C. J. SOTHCOTT, *Duckwing,* 2 y., 4 m.

CLASS 51.—MALAY COCKS. 4 entries.

First Prize, 1*l.* 10*s.*; JOHN FRAYN, 12 m.
Second Prize, 15*s.*; J. C. HUXTABLE, about 7 m.
Third Prize, 5*s.*; G. F. WARD.
Highly Commended, J. C. HUXTABLE, over 1 y.

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* Given by the Rochester and Chatham Local Committee, for the best Exhibit in any of the Classes.

CLASS 52.—MALAY HENS. 4 entries.

First Prize, 1*l.* 10*s.*; J. C. HUXTABLE, over 1 y.
Second Prize, 15*s.*; JOHN FRAYN, 12 m.
Third Prize, 5*s.*; G. F. WARD.
Very Highly Commended, J. C. HUXTABLE, over 1 y.

CLASS 53.—INDIAN GAME COCKS. 3 entries.

First Prize, 1*l.* 10*s.*; JAMES FRAYNE.
Second Prize, 15*s.*; JOHN FRAYN, over 6 m.
Third Prize, 5*s.*; G. T. WHITFIELD.

CLASS 54.—INDIAN GAME HENS. 6 entries.

First Prize, 1*l.* 10*s.*; JOHN FRAYN, over 6 m.
Second Prize, 15*s.*; JAMES FRAYNE.
Third Prize, 5*s.*; G. T. WHITFIELD.
Very Highly Commended, C. RADFORD; J. FRY, 3 y.
Highly Commended, J. FRY, 2 y.

CLASS 55.—ANY OTHER DISTINCT VARIETY NOT MENTIONED—COCKS. 7 entries.

First Prize, 1*l.* 10*s.*; S. W. THOMAS, *Crêve*, over 1 y.
Second Prize, 15*s.*; J. RAWNSLEY, *Sultan*.
Third Prize, 5*s.*; T. LAMBERT, *Andalusian*, 1 y.
Highly Commended, W. F. LE BOUTILLIER, *Andalusian*, 2 y.

CLASS 56.—ANY OTHER DISTINCT VARIETY NOT MENTIONED—HENS. 6 entries.

First Prize, 1*l.* 10*s.*; S. W. THOMAS, *Crêve*, over 1 y.
Second Prize, 15*s.*; J. RAWNSLEY, *Sultan*.
Third Prize, 5*s.*; W. F. LE BOUTILLIER, *Andalusian*, 2 y.
Commended, R. D. BATCHELOR, *Black Java*, 3 y.

CLASS 57.—CHICKENS OF 1890 (DORKING, GAME, MALAY, INDIAN GAME, OR ANY OTHER VARIETY NOT MENTIONED)—COCKERELS. 5 entries.

First Prize, 1*l.* 10*s.*; A. E. W. DARBY, *Dorking*, hatched 1890.
Second Prize, 15*s.*; Rev. R. S. S. WOODGATE, *White Dorking*, 4 m., 2 w.
Third Prize, 5*s.*; J. FRY, *Indian Game*, 14 w.
Very Highly Commended, R. CHEESMAN, *Dorking*, 5 m.

CLASS 58.—CHICKENS OF 1890 (DORKING, GAME, MALAY, INDIAN GAME, OR ANY OTHER VARIETY NOT MENTIONED)—PULLETS. 3 entries.

First Prize, 1*l.* 10*s.*; J. M. STOCKBRIDGE, *Dorking*, 5 m.
Second Prize, 15*s.*; JOHN FRAYN, *Indian Game*, 1890.
Third Prize, 5*s.*; R. CHEESMAN, *Dorking*, 5 m.

CLASS 59.—CHICKENS OF 1890—(EITHER PURE BRED OR CROSS BRED)—TWO COCKERELS. 12 entries.

First Prize, 1*l.* 10*s.*, and Cup;* J. M. STOCKBRIDGE, *Dorking*, 5 m.
Second Prize, 15*s.*; Rev. R. S. S. WOODGATE, 4 m., 3 d.
Third Prize, 5*s.*; JAMES FRAYNE, *Indian Game*.
Commended, F. W. HERBERT, *Dorkings*, Feb. 28th.

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* A Silver Cup, value 3*l.*, was given by the Proprietors of the 'Field' newspaper for the best entry in Classes 59 and 60.

CLASS 60.—CHICKENS OF 1890—(EITHER PURE BRED OR CROSS BRED)—TWO PULLETS. 7 entries.

First Prize, 1*l.* 10*s.*; R. B. CURTEIS, *Dorking*, 15 w.
Second Prize, 15*s.*; JAMES FRAYNE, *Indian Game.*
Third Prize, 5*s.*; F. TOOTH, *Dorking*, 4 m.
Commended, P. L. BENSON, M.D., *Langshan*, 5 m.

SECTION IV.—DUCKS, GEESE AND TURKEYS.

CLASS 61.—DRAKE OR DUCK (ROUEN OR AYLESBURY). 3 entries.

First Prize, 1*l.* 10*s.*; F. W. CHAMPNEYS, *Rouen*, over 2 y.
Second Prize, 15*s.*; W. WESTON, *Aylesbury*; 12 m.

CLASS 62.—DRAKE OR DUCK (PEKIN). 7 entries.

First Prize, 1*l.* 10*s.*; S. BROWN, 1 y.
Second Prize, 15*s.*; T. ALLEN, over 1 y.
Third Prize, 5*s.*; T. ALLEN, 1 y.
Highly Commended, T. ALLEN, 1 y.

CLASS 63.—COUPLE OF DUCKLINGS (ANY PURE OR CROSS-BRED VARIETY). 7 entries.

First Prize, 1*l.* 10*s.*; E. BARNES, about 3 m.
Second Prize, 15*s.*; W. BYGOTT, 3 m.
Third Prize, 5*s.*; W. BYGOTT, 3 m.
Highly Commended, E. BARNES, about 3 m.; T. ALLEN, *Pekin*, 3 m.

CLASS 64.—GANDER OR GOOSE (ANY VARIETY). 2 entries.

First Prize, 1*l.* 10*s.*; C. J. SOTHCOTT, *Toulouse*, 3 y., 2 m.
Second Prize, 15*s.*; C. P. WELLINGTON, *Toulouse*, 3 y.

CLASS 65.—TURKEYS (COCK OR HEN). 7 entries.

First Prize, 1*l.* 10*s.*; H. T. GOODENOUGH, *bronze* cock, 3¼ y.
Second Prize, 15*s.*; F. WARDE.
Third Prize, 15*s.*; D. T. ARMES, *bronze* cock, 1 y.
Very Highly Commended, J. LE FEAVER, *Cambridge* cock, 12 m.; Mrs. T. J. SMITH, *bronze*, 1 y.

SECTION V.—FANCY BREEDS.

CLASS 66.—BANTAM (BLACK OR WHITE) COCKS. 12 entries.

First Prize, 1*l.*; W. BIRCHALL, *black rosecomb*, 1 y.
Second Prize, 10*s.*; O. E. CRESSWELL, *white*, over 1 y.
Third Prize, 5*s.*; LARKING BROTHERS, *black rosecomb*, 14 w
Highly Commended, W. CANNAN, *black*; J. A. DAKIN.

CLASS 67.—BANTAM (BLACK OR WHITE) HENS. 14 entries.

First Prize, 1*l.*; J. A. DAKIN.
Second Prize, 10*s.*; O. E. CRESSWELL, *white*, over 1 y.
Third Prize, 5*s.*; W. CANNAN, *black.*
Highly Commended, O. E. CRESSWELL, *white*, over 1 y.; J. CRUNDELL, *black rosecomb*, 12 m.; Miss A. HARWOOD, *black rosecomb*, 1 y.; VICTOR LARKING BROTHERS, *black rosecomb*, 2 y.; and J. RAWNSLEY, *black.*

CLASS 68.—BANTAM (GAME, ANY VARIETY) COCKS. 13 entries.

First Prize, 1*l.*; E. MORGAN, 1889.
Second Prize, 10*s.*; E. COEKE, *black red*, 1889.
Third Prize, 5*s.*; J. C. HUXTABLE, jun.
Highly Commended, T. HENRY, 15 m.; T. HENRY, 2 y.; and J. W. MAYO, *black red*, 18 m.
Commended, J. D. AMBROSE, 1889.

CLASS 69.—BANTAM (GAME, ANY VARIETY) HENS. 12 entries.

First Prize, 1*l.*; J. W. MAYO, *black red*, 18 m.
Second Prize, 10*s.*; T. HENRY, 15 m.
Third Prize, 5*s.*; J. D. AMBROSE, 1889.
Highly Commended, T. HENRY, 15 m.; J. W. MAYO, *black red*, 18 m.; E. MORGAN, 1889.

CLASS 70.—BANTAM (ANY OTHER DISTINCT VARIETY) COCKS. 8 entries.

First Prize, 1*l.*; H. PICKLES.
Second Prize, 10*s.*; O. E. CRESSWELL, *Japanese*, over 1 y.
Third Prize, 5*s.*; F. GEARY, *Gold Sebright*, 2 y.

CLASS 71.—BANTAM (ANY OTHER DISTINCT VARIETY) HENS. 7 entries.

First Prize, 1*l.*; F. GEARY, *silver*, 2 y.
Second Prize, 10*s.*; F. GEARY, *gold*, 2 y.
Third Prize, 5*s.*; O. E. CRESSWELL, *Japanese*, over 1 y.
Very Highly Commended, H. PICKLES.
Highly Commended, F. PLUMPTRE, *Silver Sebright*.

Bath and West of England and Southern Counties Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

Terms and Privileges of Membership.

A Subscriber of 1*l.* annually is a Member entitled to all the privileges of the Society; but tenant-farmers, the rateable value of whose holdings does not exceed 200*l.* a-year, can become Members on subscribing 10*s.* annually. All Members are entitled:—

1. To receive the Society's 'Journal' free of expense.
2. To obtain opinions and analyses with regard to Manures, Soils, Feeding Stuffs, &c., at very low rates. (See p. lv.)
3. To obtain reports and results of examinations of Seeds and Plants at very low rates. (See p. liv.)

Members (elected three months previous to the closing of the Entries) subscribing 1*l.* annually are, in addition to the above-named privileges, entitled:—

4. To make an unlimited number of Stock and Implement Entries at the Society's Annual Exhibitions at reduced fees.

Admission to Exhibitions.

5. Members subscribing less than 1*l.* annually are admitted free to the Society's Exhibitions and to the Reserved Seats in the Grand Stand, the Working Dairy, and the Band Enclosure for *one day* only, but Members subscribing 1*l.* annually are admitted free during *the whole time* of the Annual Show.

The payment of 10*l.* in one sum constitutes a Member for life.

A Member subscribing 2*l.* annually is a Governor and eligible for election as a Vice-President. In addition to all the above-mentioned privileges, he is entitled:—

6. To nominate one friend to the Society's Exhibitions and to the Reserved Seats in the Grand Stand, the

Working Dairy, and the Band Enclosure during *the whole time* of the Annual Show, and another friend for every further pound subscribed.

The payment of 20*l.* in one sum constitutes a Governor for life.

The Society's Journal.

The *Journal*, which is published annually, has for its aim the dissemination of Agricultural knowledge in a popular form, and affords a medium for recording and discussing the chief topics of interest in this direction which have been ventilated during the year. In addition to original papers by well-known authorities on the subjects with which they deal, it contains Reports on the Live-Stock, Implements, &c., exhibited at the Society's Shows, together with other particulars of the Society's operations, Prize Awards, Financial Statements, Lists of Members, &c. The price of the *Journal* to Non-Members is 6*s.* 5*d.*, post free.

Chemical Analyses.

Special arrangements are made by which Members can obtain at reduced rates of charge (particulars of which are given on p. lv) opinions and analyses with regard to Manures, Soils, Feeding Stuffs, Animal Products, Water, &c., from the Society's Consulting Chemist, Dr. J. A. Voelcker, B.A., B.Sc.; F.C.S.

Botanical Examinations.

Special arrangements are also made by which Members can have Seeds and Plants reported on by the Society's Consulting Botanist, Mr. W. Carruthers, F.R.S., at the rates stated on p. liv.

The Annual Exhibitions.

Prizes to a large amount are given at the Annual Exhibitions for Agricultural Stock, Cheese, Butter, Poultry, Horse-shoeing, &c. Provision is likewise made for the exhibition of Agricultural Implements and Machinery, Seeds, Feeding Stuffs, Artificial Manures, &c.

There are also departments for the encouragement of Horticulture, local manufactures, and the Fine Arts included in the Exhibition.

Dairying.

Migratory Dairy Schools visit such districts as may desire them, for the purpose of teaching the best methods of cheese and butter-making, the Society providing the Teaching Staff,

appliances, &c. Particulars of their working can be obtained of the Society's Secretary.

A Working Dairy is a special feature of the Annual Exhibition, in which explanatory lectures and demonstrations with reference to every branch of Dairy Husbandry are given; various dairying operations and the implements employed in them are tested and compared; and Butter-making Competitions for farmers' wives and daughters, and dairy men and maids, are carried on.

The Experimental Department.

The work of this Department is being carried out under the direction of a Special Committee, who are conducting experiments in various parts of the kingdom, the results of which are published in the Society's 'Journal.' The special objects of the Department are:—

(*a.*) To test the advantages, or otherwise, of the use of artificial manures, on corn and grass, on land in ordinary farming condition, based on the results obtained from the Rothamsted and Woburn Experiments.

(*b.*) To examine, test, and exhibit, any new processes for dealing with Agricultural produce which appear likely to be beneficial.

(*c.*) To collect and publish information on new systems of cultivation, routine of crops, or other efforts which are being made for the profitable cultivation of land under probable low prices of corn.

The Art and Art-Manufactures Departments.

The chief objects the Society has in view in maintaining these departments are — 1st—The encouragement of young artists, especially, and of local efforts to bring art-workmanship to bear in the production of decorative or useful articles; 2nd—The exhibition of such art treasures as there may be in private or other collections, to which the public ordinarily have no access. Exhibitions of Pictures and other works of Art are held annually in the cities and towns visited by the Society, and in connection therewith an Art Union for pictures is held, under the sanction of the Privy Council.

Any person desirous of joining the Society can be proposed by a Member or by the Secretary (Thos. F. Plowman, 4, Terrace Walk, Bath).

Bath and West of England and Southern Counties Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

GENERAL LAWS.

"I. The Society shall consist of a President, Vice-Presidents, Council, Treasurer, Secretary, Governors, and Members, and shall have the following objects:—

"1st. To hold meetings in the West and South of England for the exhibition of breeding stock, agricultural implements, and such other articles connected with agriculture, arts, manufactures, or commerce, as may be determined upon by the Council.

"2nd. To offer premiums for essays and reports on subjects affecting agriculture, and to publish a Journal for circulation.

"II. The West of England shall be divided into two districts, to be called the Eastern and Western, and the boundary line separating Devon from Somerset and Dorset shall be the division of such districts; and the following counties, viz., Hants, Berks, Oxford, Surrey, Sussex, and Kent, shall form a third district, to be called the Southern.

"III. The Council shall consist of a president, vice-presidents, and sixty-six other members (thirty-three of whom shall retire annually by rotation, but shall be eligible for re-election), and shall be elected by the whole body of members. Eighteen members of the Council shall be chosen from persons residing or representing property in the Eastern District, eighteen from persons residing or representing property in the Western District, eighteen from persons residing or representing property in the Southern District, and the remaining twelve may be elected from the general body of members, without reference to districts.

"IV. The election of President and Council shall take place at the annual meeting; and they shall enter into office at the conclusion of the annual meeting at which they have been chosen. The Council shall have power to nominate Vice-Presidents, and fill up such vacancies as are left after the annual meeting and in their own body as may from time to time occur during the interval between the annual meetings.

"V. The entire management of the Society, including the power of making bye-laws, of settling the prizes to be awarded, of nominating the committees, fixing the places of meetings, of appointing or removing the Treasurer, Secretary, and such other officers as may be required to carry on the business of this Society, shall be vested in the Council, who shall report their proceedings at the annual meeting.

"VI. The meetings for exhibitions shall be held in different towns in successive years.

"VII. A subscriber of 1*l.* and upwards annually shall be a member entitled to all the privileges of the Society; of 2*l.*, a governor, and eligible for election as a vice-president; and a tenant-farmer, the rateable value of whose holding does not exceed 200*l.* a year, shall by subscribing 10*s.* and upwards annually also be a member of the Society without the privilege of exhibiting at reduced fees (see Law IX.). Each member shall be liable to pay his subscription, until he shall have given notice in writing to the Secretary of his intention to withdraw. The subscriptions to become due and be paid in advance on the 1st of January in each year. All firms of two or more persons shall subscribe not less than 1*l.* annually.

"VIII. The payment of 10*l.* in one sum shall constitute a member for life, and of 20*l.* in one sum a governor for life; but any member who has subscribed not less than 1*l.* annually for a period of twenty years and upwards may become a life member on the further payment of 5*l.* in one sum; and any governor who has subscribed not less than 2*l.* annually for the same period may become a life governor on the further payment of 10*l.* in one sum.

"IX. To entitle a member to exhibit, he must have been a member for three months, and have paid his subscription, of not less than 1*l.* for the current year, at least one month previous to the closing of the entries. Members subscribing less than 1*l.* and non-members will be permitted to exhibit stock, agricultural implements, or other articles, on payment of such a sum as the Council shall direct.

"X. The Annual Meetings of the Society shall be held in the months of May or June. Special General Meetings may be convened by the President on the written requisition of not less than three members of Council, all members of the Society having fourteen days' notice of the object for which they are called together. At such Annual or Special General Meetings no member of less than three months' standing, or whose subscription is in arrear shall be entitled to a vote.

"XI. If it be proved to the satisfaction of the Council that any person has attempted to gain a prize in this or any Agricultural Society by a false Certificate, or by a misrepresentation of any kind, such person shall thereupon be excluded from again exhibiting in this Society.

"XII. All prizes shall be open for competition to the United Kingdom. But no exhibitor of stock, or person intending to compete for any of the Society's prizes, shall be privy to the selection of judges to award the premiums.

"XIII. The proceedings of the Society, including the Prize Report and List of Members, shall be printed annually, and every subscriber not in arrear with his subscription shall be entitled to receive one copy, free of expense, and there shall be an additional number printed for sale.

"XIV. No new general rule shall be proposed, or existing one altered or rescinded, excepting at an Annual or Special General Meeting, and then only provided a statement in writing shall have been sent to the Secretary at least twenty-one days previously, setting forth the rule to be proposed, rescinded, or altered; and in the last case the proposed alteration shall be stated.

"XV. No subject or question of a political tendency shall ever be introduced at any meeting of this Society."

Bath and West of England and Southern Counties Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

List of Officers.

1890–91.

BATH MEETING.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT FOR 1890–91.

THE RIGHT HON. THE EARL TEMPLE.

TRUSTEES.

*ACLAND, THE RIGHT HON. SIR THOMAS DYKE, Bart., Killerton, Exeter.
PAGET, SIR RICHARD HORNER, Bart., M.P., Cranmore Hall, Shepton Mallet.
LENNARD, SIR JOHN FARNABY, Bart., Wickham Court, Beckenham, Kent.

VICE-PRESIDENTS.

*ABERGAVENNY, MARQUESS OF, K.G.	Eridge Castle, Tunbridge Wells
*ACLAND, RIGHT HON. SIR T. D., Bart.	Killerton, Exeter
*AMHERST, EARL	Montreal, Sevenoaks, Kent
BARNETT, H.	Glympton Park, Woodstock
*BATH, MARQUESS OF	Longleat, Warminster
BELFIELD, JOHN	Primley Hill, Torquay
*BENYON, RICHARD	Englefield House, Reading
BRASSEY, H. A.	Preston Hall, Aylesford
*BROOKE, LORD, M.P.	Easton Lodge, Dunmow
BRUCE, W. A.	96, Sydney Place, Bath
BRYMER, W. E.	Ilsington House, Dorchester
CALTHORPE, LORD	Elvetham Park, Winchfield
*CARLINGFORD, LORD	Chewton Mendip, Somerset
*CARNARVON, EARL OF	Highclere Castle, Newbury
*CLINTON, LORD	Heanton Satchville, Beaford, N. Devon
CLEVELAND, DUKE OF, K.G.	Bathwick, Bath
*CORK AND ORRERY, EARL OF	Marston, Frome
CORYTON, COL. A.	Pentillie Castle, Plymouth
*COVENTRY, EARL OF	Croome Court, Severn Stoke, Worcester
*DARNLEY, EARL OF	Cobham Hall, Gravesend
DAVIE, SIR H. R. F., Bart.	Creedy Park, Crediton
DAW, R. R. M.	Spurbarne, Exeter

*** Those to whose names an asterisk (*) is prefixed have filled the office of President.

VICE-PRESIDENTS—*continued.*

DEVONSHIRE, DUKE OF, K.G.	Chatsworth, Derbyshire
DIGBY, G. D. W.	Sherborne Castle, Sherborne
*DUCIE, EARL OF	Tortworth, Falfield, R.S.O.
*FORTESCUE, EARL	Castle Hill, South Molton
GORING, REV. J.	Wiston Park, Steyning
*HAMPDEN, VISCOUNT	Glynde, near Lewes
HIPPESLEY, J. H.	Ston Easton, Somerset
HOOD, SIR A. ACLAND, Bart.	St. Audries, Bridgwater
HULSE, SIR E., Bart.	Breamore, Salisbury
*ILCHESTER, EARL OF	Melbury, Dorchester
*JERSEY, EARL OF	Middleton Park, Bicester, Oxon.
KNYFTON, T. TUTTON	Uphill, Weston-super-Mare
*LANSDOWNE, MARQUESS OF	Bowood, Calne
LECONFIELD, LORD	Petworth House, Sussex
LENNARD, SIR J. F., Bart.	Wickham Court, Beckenham, Kent
*LOPES, SIR M., Bart.	Marristow, Roborough, S. Devon
LOVELACE, EARL OF	Ashley Combe, Porlock, Somerset
LOYD, LEWIS	Monk's Orchard, Bromley, Kent
MILDMAY, SIR H. ST. JOHN, Bart.	Dogmersfield Park, Winchfield
MOORE-STEVENS, J. C.	Winscott, Great Torrington
MORETON, LORD	Tortworth, Falfield, R.S.O.
*MORLEY, EARL OF	Saltram, Plympton, Devon
MORRELL, G. HERBERT	Headington Hill Hall, Oxford
*MOUNT-EDGCUMBE, EARL OF	Mount-Edgcumbe, Devonport
MOYSEY, HENRY GORGES	Bathealton Court, Wiveliscombe
MURCH, JEROM	Cranwells, Bath
NORTHUMBERLAND, DUKE OF	Albany Park, Guildford
PAGET, Sir R. H., Bart., M.P.	Cranmore Hall, Shepton Mallet
PINNEY, W.	Somerton
POLTIMORE, LORD	Poltimore, Exeter
PORTAL, MELVILLE	Laverstock House, Micheldever, [Hants
*PORTSMOUTH, EARL OF	Eggesford House, N. Devon
RICHMOND, DUKE OF, K.G.	Goodwood Park, Chichester
SAINT GERMANS, EARL OF	Port Elliot, Devonport
STORY-MASKELYNE, N., M.P.	Basset Down House, Swindon
STUCLEY, SIR G. S., Bart.	Moreton, Bideford, N. Devon
THYNNE, LORD HENRY	
*TREDEGAR, LORD	Tredegar Park, Newport, Monmouth
*TREMAYNE, JOHN	Heligan, St. Austel
TROYTE, COL.	Huntsham Court, Bampton, Devon
WALTER, JOHN	Bearwood, Wokingham
WEYMOUTH, LORD, M.P.	Longleat, Warminster
WINCHESTER, MARQUESS OF	Amport St. Mary's, Andover

THE LORD WARDEN OF THE STANNARIES.
THE SURVEYOR-GENERAL OF THE DUCHY OF CORNWALL.
THE RECEIVER-GENERAL OF THE DUCHY OF CORNWALL.

*** Those to whose names an asterisk (*) is prefixed have filled the office of President.

MEMBERS OF COUNCIL.

EASTERN DIVISION.

Elected in 1889:—

Name.	*Address.*
Bush, R. H.	The Castle, Chew Magna, Somerset
Duke, Thomas	Long Ashton Lodge, Clifton
Edwards, C. L. F.	The Court, Axbridge, Somerset
Fife, Capt. W.	Sandley House, Gillingham, Dorset
Gibbs, Antony	Charlton House, Nailsea, Somerset
Jones, Henry Parr	Portway House, Warminster
Luttrell, C.B., Col.	Badgworth Court, Axbridge, R.S.O., Somerset
Sanford, E. C. A.	Nynehead Court, Wellington
Skinner, A. C.	Bishop's Lydeard, Taunton

Elected in 1890:—

Name.	*Address.*
Arkwright, J. H.	Hampton Court, Leominster
Danger, Thomas	Rowford Lodge, Taunton
Knollys, J. E.	Fitzhead Court, Taunton
Maule, M. St. J.	Chapel House, Bath
Napier, H. B.	Chippenham
Neville-Grenville, R.	Butleigh Court, Glastonbury
Sherston, Capt. J. D.	Evercreech, Bath
Williams, E. W.	Herringston, Dorchester

WESTERN DIVISION.

Acland, C. T. D., M.P.	Killerton, Exeter
Calmady, V. P.	Tetcott, Holsworthy
Drewe, Major-Gen. F. E.	The Grange, Honiton
Dymond, Francis W.	Bampfylde House, Exeter
Naper, Col. W. D.	Stanley Lodge, Exmouth
Sanders, E. J.	Stoke House, Exeter
Sillifant, A. O.	Coombe, Copplestone
Trood, Col. R.	Matford, Exeter
Walrond, Sir W. H., Bart., M.P.	New Court, Topsham, Devon
Collins, C. R.	Strathculm, Hele, Cullompton
Ley, J. H.	Trehill, Exeter
Marker, Richard	Combe, Honiton
Newbery, S. P.	Plympton St. Mary, South Devon
Pratt, J. D.	Pratts Hayes, Exmouth
Shelley, Sir J., Bt.	Shobrooke Park, Crediton
Williams, Sir W. R., Bart.	Heanton, Barnstaple
Wippell, Richard	Rudway, Thorverton
Wyatt-Edgell, Col. Arthur	Cowley House, Exeter

SOUTHERN DIVISION.

Ashcroft, W.	Hayes, Beckenham, Kent
Best, Capt. J. C. (R.N.)	Plas-yn-Vivod, Llangollen
Cobb, H. M.	Higham, Kent
Gill, Frederick	Speenhamland, Newbury
Goringe, Hugh	Kingston-by-Sea, Brighton
Pain, C.	Longstock, Stockbridge, Hants
Parker, James S.	Freelands, Iffley, Oxford
Seymour, R. A. H.	Aylesford, Kent
Sutton, Martin J.	Dyson's Wood, Kidmore, near Reading
Best, Col. G.	Charlton House, Ludwell, Salisbury
Brassey, A.	Heythrop, Chipping Norton, Oxon
Druce, A. F. M.	Fyfield, Abingdon
Grenfell, Arthur	4, Savile Row, London, W.
Simpson, G.	Wray Park, Reigate
Stanford, A.	Eatons, Steyning
Warre, F.	44, Great Ormond Street, Bloomsbury, London
Whitehead, C., F.L.S.	Barming House, Maidstone
Williams, A. G.	Portsea, Hants

ELECTED WITHOUT REFERENCE TO DISTRICT.

Butler, Capt. W. J. Casbard	The Elms, Taplow.
Brown, W. J.	Middlehill House, Box, Wilts
Chorley, W. L.	Quarme, Dunster
Ford, Henry	Lower House, Branscombe, Sidmouth, Devon
Gibbons, George	Tunley, Bath
Hancock, J. D.	Halse, Taunton
Allen, James D.	Belle Vue House, Evercreech
Llewellyn, Evan H., M.P.	Langford Court, Bristol
Martin, G. E.	Ham Court, Upton-on-Severn
Naylor, Christopher	Kerry, Montgomeryshire
Rolls, John Allan	The Hendre, Monmouth
Skrine, H. D.	Claverton Manor, Bath

EX-OFFICIO MEMBERS.

The Treasurer . . . . . Badcock, Henry Jeffries, Somersetshire Bank, Taunton.

Consulting Surveyor . . Spackman, Henry, 6, Terrace Walk, Bath.

COMMITTEES, 1890–91.

[The President is *ex-officio* Member of all Committees.]

FINANCE.

Jones, H. P., *Chairman.*

Collins, C. R. | Knollys, J. E. | Martin, G. E.

PUBLICATIONS.

Acland, Right Hon. Sir Thomas Dyke, Bart., *Chairman.*

Acland, C. T. D. (M.P.)
Dymond, F. W.
Knollys, J. E. [(C.B.)
Luttrell, Col. H. A. F.
Maskelyne, N. S.-(M.P.)

STOCK PRIZE-SHEET.

Luttrell, Col. H. A. F. (C.B.), *Chairman.*

Best, Col. J.
Brown, W. J.
Danger, T.
Drewe, Major-Gen. F. E.
Druce, A. F. M.
Gibbons, G.
Hancock, J. D.
Lennard, Sir J. F., Bt.
Marker, R.
Moore-Stevens, J. C.
Shelley, Sir J., Bt.
Sanford, E. C. A.
Stanford, A.
Troyte, Col.
Williams, E. W.

JUDGES' SELECTION.

Luttrell, Col. H. A. F. (C.B.), *Chairman.*

Allen, J. D.
Brown, W. J.
Chorley, W. L.
Drewe, Maj.-Gen. F. E.
Druce, A. F. M.
Gibbons, G.
Lennard, Sir J. F., Bt.
Moore-Stevens, J. C.
Shelley, Sir J., Bt.
Williams, E. W.

IMPLEMENT REGULATIONS.

Knollys, J. E., *Chairman.*

Acland, C. T. D. (M.P.)
Best, Capt. J. C. (R.N.)
Boteler, Capt. W. J. C. (R.N.)
Dyke, T.
Edwards, C. L. F.
Gibbons, G.
Jones, H. P.
Llewellyn, E. H. (M.P.)
Napier, H. B.
Neville-Grenville, R.
Shelley, Sir J., Bt.

ALLOTMENT.

Luttrell, Col. H. A. F. (C.B.), *Chairman.*

Best, Capt. J. C. (R.N.)
Edwards, C. L. F.
Gibbons, G.
Llewellyn, E. H. (M.P.)
Napier, H. B.
Neville-Grenville, R.

RAILWAY ARRANGEMENTS.

Bruce, W. Adair, *Chairman.*

Amherst, Earl
Bush, R. H.
Cork, the Earl of.
Coventry, the Earl of.
Druce, A. F. M.
Ilchester, the Earl of
Knollys, J. E.
Lennard, Sir J. F., Bt.
Lopes, Sir M., Bart.
Morley, the Earl of
Rolls, J. A.
Shelley, Sir J., Bt.

(With power to add to their number.)

DISQUALIFYING.

The Stewards of Horses. | The Stewards of Stock.
The Stewards of Poultry.

CONTRACTS.

Luttrell, Col. H. A. F. (C.B.), *Chairman.*

Best, Capt. J. C. (R.N.)
Edwards, C. L. F.
Llewellyn, E. H. (M.P.)
Napier, H. B.
Neville-Grenville, R.
Sanford, E. C. A.

ARTS AND MANUFACTURES.

ACLAND, Right Hon. Sir T. D., Bart., *Chairman.*
WYATT-EDGELL, Col. A., *Vice-Chairman.*

ACLAND, C. T. D. (M.P.).
DAW, R. R. M.
KNOLLYS, J. E.
MOORE-STEVENS, J. C.
MORRELL, G. H.
MURCH, JEROM.
NAPER, Col. W. P.
WILLIAMS, E. W.

(With power to add to their number.)

EXPERIMENTAL.

KNOLLYS, J. E., *Chairman.*

ACLAND, Rt. Hn. Sir T. D., Bt.
ACLAND, C. T. D. (M.P.)
ALLEN, J. D.
ASHCROFT, W.
DYKE, T.
DRUCE, A. F. M.
GIBBONS, G.
JONES, H. P.
LENNARD, Sir J. F., Bt.
LLEWELLYN, E. H. (M.P.)
MASKELYNE, N. STORY-(M.P.).
PAGET, Sir R. H., Bt. (M.P.)
SUTTON, M. J.

(With power to add to their number.)

DAIRY.

KNOLLYS, J. E., *Chairman.*

ACLAND, Rt. Hon. Sir T. D., Bart.
ALLEN, J. D.
EDWARDS, C. L. F.
GIBBONS, G.
LENNARD, Sir J. F., Bt.
NAPIER, H. B.
NEVILLE-GRENVILLE, R.
PAGET, Sir R. H., Bart., M.P.
SANFORD, E. C. A.
WIPPELL, R.

AGRICULTURAL EDUCATION.

PAGET, Sir R. H., Bart., M.P., *Chairman.*

ACLAND, Rt. Hon. Sir T. D., Bart.
ACLAND, C. T. D. (M.P.)
ALLEN, J. D.
AMHERST, EARL.
EDWARDS, C. L. F.
GIBBONS, G.
GORING, Rev. J.
KNOLLYS, J. E.
LENNARD, Sir J. F., Bart.
LLEWELLYN, E. H., M.P.
MASKELYNE, N. STORY, M.P.
NAPIER, H. B.
SUTTON, M. J.

(With power to add to their number.)

Stewards.

Yard.
BEST, Capt. J. C. (R.N.)
LLEWELLYN, E. H. (M.P.)
EDWARDS, C. L. F.

Field.
KNOLLYS, J. E. JONES, H. P. DYKE, T.

Works.
NEVILLE-GRENVILLE, R. NAPIER, H. B.

Horses.
LUTTRELL (C.B.), Col. WILLIAMS, E. W.

Stock.
LENNARD, Sir J. F., Bart. DREWE, Major-Gen. F. E.
SHELLEY, Sir J., Bt. DRUCE, A. F. M.

Poultry.
BUSH, R. H. SANDERS, E. J.
EDWARDS, C. L. F. (*Assistant Steward*).

Arts.
NAPER, Col.
CUNDALL, H. M. (*Assistant Steward*).

Hops.
WHITEHEAD, C., F.L.S.

Music.
NAPER, Col.

Dairy.
GIBBONS, G.

Forage.
BROWN, W. J.

Shoeing.
LUTTRELL (C.B.), Col.

Church Service.
GIBBONS, G.

Treasurer.
BADCOCK, H. J.

Local Treasurer.
DYMOND, F. W.

Consulting Surveyor.
SPACKMAN, H.

Superintendent of Works.
ROSSITER, J.

Consulting Chemist.
VOELCKER, Dr. J. A., F.C.S.

Consulting Botanist.
CARRUTHERS, W., F.R.S.

Editor of 'Journal.'
PLOWMAN, THOS. F.

Associate Editor.
LLOYD, F. J., F.C.S.

Auditor.
GOODMAN, A. (*Chartered Accountant.*)

Veterinary Inspector.
BROWN, Prof. G. T. (C.B.)

Secretary—PLOWMAN, THOMAS F.

Member's Privileges.

EXAMINATION OF PLANTS AND SEEDS.

The Council have arranged for the following rates of charge for the examination, by the Society's Consulting Botanist, of Plants and Seeds for the *bonâ fide* and individual information and benefit of Members of the Society (not being seedsmen). The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

No.		
1.	A report on the purity and germinating power of a sample of seed, stating the sorts and amount of any other seeds found therein ..	1*s.*
2.	Determination of the species of any weed or other plant, or of any epiphyte or vegetable parasite, with a report on its habits, and the means for its extermination or prevention	1*s.*
3.	Report on any disease affecting farm crops	1*s.*
4.	Determination of the species of a collection of natural grasses found in any district, with a report on their habits and pasture value ..	5*s.*

N.B.—The Consulting Botanist's Reports on Seeds are furnished to enable Members,—purchasers of seeds and corn for Agricultural or Horticultural purposes,—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes.

PURCHASE OF SEEDS.

The purchaser should obtain from the vendor, by invoice or otherwise, a proper designation of the seed he buys, with a guarantee that it contains not more than a specified amount of other seeds, and is free from ergot, or, in the case of clovers, from dodder, and of the percentage of seeds that will germinate.

The germination of cereals, green crops, clover, and timothy grass should be not less than 90 per cent.; of fox-tail not less than 60 per cent.; of other grasses not less than 70 per cent.

The Council strongly recommend that the purchase of prepared mixtures should be avoided, and that the different seeds to be sown should be purchased separately.

INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES.

I. Seeds.

In sending seed or corn for examination the utmost care must be taken to secure a fair and honest sample. In the case of grass-seeds the sample should be drawn from the centre of the sack or bag, and in all cases from the bulk delivered to the purchaser and not from the purchase sample. When bought by sample, the whole or part of that sample should also be sent.

When it is considered necessary to secure legal evidence, the sample should be taken from the bulk and placed in a sealed bag in the presence of a reliable witness who is acquainted with the identity of the bulk, and care should be taken that the purchased sample and bulk be not tampered with after delivery, or mixed or come in contact with any other sample or stock.

One ounce of grass and other small seeds should be sent, and two ounces of cereals or larger seeds. The exact name under which the seed has been bought should be sent with it.

Grass-seeds should be sent at least FOUR WEEKS, *and clover-seeds* TWO WEEKS *before they are required, and they should not be sown until the report has been received.*

II. Plants.

In collecting specimens of plants, the whole plant should be taken up, and the earth shaken from the roots. If possible, the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They should be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage prepaid) must be addressed to Mr. W. CARRUTHERS, F.R.S., 43, Central Hill, Norwood, London, S.E.

Member's Privileges.

ANALYSES OF MANURES, SOILS, &c.

(Applicable only to the case of Persons who are not commercially engaged in the manufacture or sale of any substance sent for Analysis.)

THE Council have fixed the following rates of Charges for Chemical Analysis to Members of the Society.

These privileges are applicable only when the Analyses are for *bonâ-fide* agricultural purposes, and are required by Members of the Society for their own use and guidance in respect of farms or land in their own occupation and within the United Kingdom.

The analyses are given on the understanding that they are required for the individual and sole benefit of the Member applying for them, and must not be used for other persons, or for commercial purposes.

Land or estate agents, bailiffs, and others, when forwarding samples, are required to state the names of those members on whose behalf they apply.

Members are also allowed to send for analysis under these privileges any manures or feeding-stuffs to be used by their outgoing tenants, or which are to be given free of cost to their occupying tenants.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

Members are requested, when applying for an analysis, to quote the number in the subjoined schedule under which they wish it to be made.

The fees for analysis must be sent to the Consulting Chemist at the time of application.

No.		
1.	—An opinion of the purity of bone-dust or oil-cake (each sample)	2*s.* 6*d.*
2.	—An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged	5*s.*
3.	—An analysis of guano; showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
4.	—An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged	5*s.*
5.	—An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia, together with an opinion as to whether it be worth the price charged	10*s.*
6.	—An analysis of bone-dust, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged	10*s.*
7.	—An analysis of compound artificial manures, animal products, refuse substances used for manures, &c.	from 10*s.* to £1
8.	—An analysis of limestone, showing the proportion of lime	7*s.* 6*d.*
9.	—An analysis of limestone, showing the proportion of lime and magnesia	10*s.*
10.	—An analysis of limestone or marls, showing the proportion of carbonate, phosphate, and sulphate of lime and magnesia, with sand and clay	10*s.*
11.	—Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime	10*s.*
12.	—Complete analysis of a soil	£3
13.	—An analysis of oil-cake or other substance used for feeding purposes, showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre, as well as of starch, gum, and sugar in the aggregate; and an opinion of its feeding and fattening or milk-producing properties	10*s.*
14.	—Analysis of any vegetable product	10*s.*
15.	—Determination of the "hardness" of a sample of water before and after boiling	5*s.*
16.	—Analysis of water of land-drainage, and of water used for irrigation	£1
17.	—Analysis of water used for domestic purposes	£1 10*s.*
18.	—An analysis of milk (to assist Members in the management of their Dairies and Herds, *bonâ fide* for their own information and not for trade purposes, nor for use in connection with the Sale of Food and Drugs Acts)	5*s.*
19.	—Personal consultation with the Consulting Chemist. (To prevent disappointment it is suggested that Members desiring to hold a consultation with the Consulting Chemist should write to make an appointment)	5*s.*
20.	—Consultation by letter	5*s.*
21.	—Consultation necessitating the writing of three or more letters	10*s.*

Members wishing to exercise their privileges on the above-named terms, should forward their samples for examination *by parcel, prepaid*, to the Consulting Chemist, DR. JOHN AUGUSTUS VOELCKER, F.C.S., 11, Salisbury Square, Fleet Street, London, E.C. The fees for analyses must be sent at the time of application.

BATH MEETING.

WEDNESDAY, THURSDAY, FRIDAY, SATURDAY, AND MONDAY, JUNE 3, 4, 5, 6, AND 8, 1891.

PRIZES FOR STOCK, DAIRY PRODUCE, &c.

	£	s.	d.		Page
Horses	413	0	0	..	lvii
Cattle	1145	0	0	..	lviii
Sheep	553	0	0	...	lix
Pigs	210	0	0	..	lxi
Wool	14	0	0	..	lxii
Cheese	145	10	0	..	lxii
Butter and Cream	56	10	0	..	lxiii
Butter-making	76	0	0	..	lxiv
Horse Shoeing	6	6	0	..	lxv
Poultry	178	0	0	..	lxxii
Total	£2797	6	0		

The above Prizes are given in the following proportions:—

	£	s.	d.
By the Society	2534	6	0
„ Somerset Agricultural Association ..	103	0	0
„ Messrs. Wm. Lewis & Son	100	0	0
„ Bath Local Committee	50	0	0
„ Shropshire Sheep Breeders' Assoc. ..	10	0	0
	£2797	6	0

MEDALS.

In addition to the above Prizes, there are offered:—

A GOLD MEDAL, or BRONZE MEDAL and 5*l.*, in the Hunter Classes, by the Hunters' Improvement Society.

A GOLD, a SILVER, and a BRONZE MEDAL, in the Jersey Cattle Classes, by the English Jersey Cattle Society.

A GOLD, a SILVER, and a BRONZE MEDAL, in the Butter-making Classes, by the Society.

Two GOLD MEDALS for Dairy Appliances, by the Society.

PRIZES.

HORSES.	First Prize.	Second Prize.	Third Prize.
	£	£	£
AGRICULTURAL.			
ıe 1st Prize in Class 1 is given by Messrs. Wm. Lewis & Son, 'Bath Herald.'			
ıASS 1.—Stallion, foaled before 1889	25	10	5
ıASS 2.—Stallion, foaled in 1889	20	10	5
ıASS 3.—Colt, foaled in 1890	10	5	3
ıASS 4.—Mare and Foal, or in-Foal . . .	20	10	5
ıASS 5.—Filly, foaled in 1888	10	5	3
ıASS 6.—Filly, foaled in 1889	10	5	3
HUNTERS.			
ıASS 7.—Mare or Gelding, foaled in 1887 . .	25	10	5
ıASS 8.—Filly or Gelding, foaled in 1888 . .	15	5	3
ıASS 9.—Filly or Gelding, foaled in 1889 . .	15	5	3
ıASS 10.—Filly or Colt, foaled in 1890 . . .	15	5	3
CHAMPION PRIZE.			
Best Entry in Class 7, 8, 9, or 10, a Silver Salver, value	20		
ıASS 11.—Mare and Foal, or in-Foal . . .	25	10	5
A Gold Medal, or a Bronze Medal and 5*l.*, at the option of the Winner, will be given by the Hunters' Improvement Society for the best Brood Mare in-Foal to, or having bred a Foal to, a Thorough-bred Horse, provided such Mare is a Prize-winner, or is Reserved, in Class 11, and has not previously won a Hunters' Improvement Society's Premium as a Brood Mare.			
HACKS.			
ıASS 12.—Mare or Gelding, over 14·2 hands . .	10	5	3
ıASS 13.—Mare or Gelding, not over 14·2 hands .	7	3	2
PONIES.			
ıASS 14.—Mare or Gelding, not over 13 hands .	7	3	2
ıASS 15.—Mare or Gelding, not over 12 hands .	5	3	2
HARNESS.			
ıASS 16.—Mare or Gelding, over 14 hands and not over 15·2	10	5	3
ıASS 17.—Mare or Gelding, over 13 hands and not over 14	10	5	3
ıASS 18.—Mare or Gelding, not over 13 hands .	7	3	2

CATTLE.	First Prize.	Second Prize.	Third Prize.
	£	£	£
DEVON.			
Class 19.—Bull, calved in 1887 or 1888 . . .	15	10	5
Class 20.—Bull, calved in 1889	15	10	5
Class 21.—Bull, calved in 1890	15	10	3
Class 22.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
Class 23.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
Class 24.—Heifer, calved in 1889	10	5	3
Class 25.—Heifer, calved in 1890	10	5	3
Champion Prizes.			
Given by the Somerset Agricultural Association.			
Best Bull in the Devon Classes . .	20		
Best Cow or Heifer ditto . .	20		
SHORT-HORN.			
Class 26.—Bull, calved in 1887 or 1888 . . .	15	10	5
Class 27.—Bull, calved in 1889	15	10	5
Class 28.—Bull, calved in 1890	15	10	3
Class 29.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
Class 30.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
Class 31.—Heifer, calved in 1889	10	5	3
Class 32.—Heifer, calved in 1890	10	5	3
Extra Prizes.			
Given by Messrs. Wm. Lewis & Son, 'Bath Herald.'			
Best Bull in the Shorthorn Classes, the property of a Tenant Farmer residing within 20 miles of Bath . . .	15		
Best Cow or Heifer ditto	10		
HEREFORD.			
Class 33.—Bull, calved in 1887 or 1888 . . .	15	10	5
Class 34.—Bull, calved in 1889	15	10	5
Class 35.—Bull, calved in 1890	15	10	3
Class 36.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
Class 37.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
Class 38.—Heifer, calved in 1889	10	5	3
Class 39.—Heifer, calved in 1890	10	5	3
SUSSEX.			
Class 40.—Bull, calved in 1887 or 1888 . . .	15	10	5
Class 41.—Bull, calved in 1889	15	10	5
Class 42.—Bull, calved in 1890	15	10	3
Class 43.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
Class 44.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
Class 45.—Heifer, calved in 1889	10	5	3
Class 46.—Heifer, calved in 1890	10	5	3

CATTLE—*continued.*	First Prize.	Second Prize.	Third Prize.
JERSEY.	£	£	£
CLASS 47.—Bull, calved in 1887 or 1888	15	10	5
CLASS 48.—Bull, calved in 1889	15	10	5
CLASS 49.—Bull, calved in 1890	15	10	3
CLASS 50.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
CLASS 51.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
CLASS 52.—Heifer, calved in 1889	10	5	3
CLASS 53.—Heifer, calved in 1890	10	5	3
The following Prizes are offered by the English Jersey Cattle Society for the 1st, 2nd and 3rd Best Cow or Heifer, in the Jersey Classes, eligible for the English Jersey Herd Book, subject to a Butter test:—			
1st Prize—A Gold Medal, or 10*l.*, at the option of the Winner.			
2nd „ —A Silver Medal.			
3rd „ —A Bronze Medal.			
GUERNSEY.			
CLASS 54.—Bull, calved in 1887 or 1888 . . .	15	10	5
CLASS 55.—Bull, calved in 1889	15	10	5
CLASS 56.—Bull, calved in 1890	15	10	3
CLASS 57.—Cow, in-Milk or in-Calf, calved before 1888	15	10	3
CLASS 58.—Heifer, in-Milk or in-Calf, calved in 1888	15	10	3
CLASS 59.—Heifer, calved in 1889	10	5	3
CLASS 60.—Heifer, calved in 1890	10	5	3
SHEEP.			
LEICESTER.			
CLASS 61.—Shearling Ram	10	5	2
CLASS 62.—Pair of Ram Lambs, dropped in 1891 .	10	5	2
CLASS 63.—Pen of three Shearling Ewes . . .	10	5	2
COTSWOLD.			
CLASS 64.—Shearling Ram	10	5	2
CLASS 65.—Pair of Ram Lambs, dropped in 1891 .	10	5	2
CLASS 66.—Pen of three Shearling Ewes . . .	10	5	2
DEVON LONG-WOOL.			
CLASS 67.—Shearling Ram	10	5	2
CLASS 68.—Pair of Ram Lambs, dropped in 1891 .	10	5	2
Extra Prize given by the Somerset Agricultural Association for the Best Ram or Ram Lamb in Class 67 or 68 . .	5		
CLASS 69.—Pen of three Shearling Ewes . . .	10	5	2

SHEEP—*continued.*	First Prize.	Second Prize.	Third Prize.	Fourth Prize.
OTHER LONG-WOOL BREEDS.	£	£	£	£
CLASS 70.—Shearling Ram	10	5	2	
CLASS 71.—Pair of Ram Lambs, dropped in 1891	10	5	2	
CLASS 72.—Pen of three Shearling Ewes	10	5	2	
CHAMPION PRIZE. Given by Messrs. Wm. Lewis & Son, 'Bath Herald,' for the Best Long-woolled Ram or Ram Lamb in any of the Classes	5			
SOUTHDOWN.				
CLASS 73.—Shearling Ram	10	5	2	
CLASS 74.—Pair of Ram Lambs, dropped in 1891	10	5	2	
CLASS 75.—Pen of three Shearling Ewes	10	5	2	
HAMPSHIRE DOWN.				
CLASS 76.—Shearling Ram	10	5	2	
CLASS 77.—Pair of Ram Lambs, dropped in 1891	10	5	2	
CLASS 78.—Pen of three Shearling Ewes	10	5	2	
SHROPSHIRE.				
CLASS 79.—Shearling Ram	10	5	3	2
CLASS 80.—Pair of Ram Lambs, dropped in 1891	10	5	2	
CLASS 81.—Pen of three Shearling Ewes	10	5	3	2
The 3rd and 4th Prizes in Classes 79 and 81 are given by the Shropshire Sheep Breeders' Assoc.				
OXFORDSHIRE DOWN.				
CLASS 82.—Shearling Ram	10	5	2	
CLASS 83.—Pair of Ram Lambs, dropped in 1891	10	5	2	
CLASS 84.—Pen of three Shearling Ewes	10	5	2	
SOMERSET AND DORSET HORN.				
CLASS 85.—Shearling Ram	10	5	2	
CLASS 86.—Pair of Ram Lambs, dropped after Dec. 1st, 1890	10	5	2	
Extra Prize given by the Somerset Agricultural Association for the Best Ram or Ram Lamb in Class 85 or 86	5			
CLASS 87.—Pen of three Shearling Ewes	10	5	2	
MOUNTAIN.				
CLASS 88.—Two Shear or Shearling Ram	10	5	2	
CLASS 89.—Pen of three Shearling Ewes	10	5	2	

SHEEP—*continued.*	First Prize.	Second Prize.	Third Prize.
OTHER SHORT-WOOL BREEDS.	£	£	
CLASS 90.—Shearling Ram	10	5	2
CLASS 91.—Pen of three Shearling Ewes . . .	10	5	2
CHAMPION PRIZE.			
Given by Messrs. Wm. Lewis & Son, 'Bath Herald,' for the Best Short-woolled Ram or Ram Lamb in any of the Classes .	5		
PIGS.*			
BERKSHIRE.			
CLASS 92.—Boar, farrowed in 1888 or 1889 . .	7	3	
CLASS 93.—Boar, farrowed in 1890	7	3	
CLASS 94.—Breeding Sow, farrowed before 1891 . .	7	3	
CLASS 95.—Pen of two Breeding Sows, farrowed in 1891	7	3	
LARGE WHITE BREED.			
CLASS 96.—Boar, farrowed in 1888 or 1889 . .	7	3	
CLASS 97.—Boar, farrowed in 1890	7	3	
CLASS 98.—Breeding Sow, farrowed before 1891 .	7	3	
CLASS 99.—Pen of two Breeding Sows, farrowed in 1891	7	3	
MIDDLE WHITE BREED.			
CLASS 100.—Boar, farrowed in 1888 or 1889 . .	7	3	
CLASS 101.—Boar, farrowed in 1890. . . .	7	3	
CLASS 102.—Breeding Sow, farrowed before 1891 .	7	3	
CLASS 103.—Pen of two Breeding Sows, farrowed in 1891	7	3	
SMALL WHITE OR SMALL BLACK BREED.			
CLASS 104.—Boar, farrowed in 1888 or 1889 . .	7	3	
CLASS 105.—Boar, farrowed in 1890 . . .	7	3	
CLASS 106.—Breeding Sow, farrowed before 1891 .	7	3	
CLASS 107.—Pen of two Breeding Sows, farrowed in 1891	7	3	
ANY OTHER BREED.			
CLASS 108.—Boar, farrowed in 1888 or 1889 . .	7	3	
CLASS 109.—Boar, farrowed in 1890. . . .	7	3	
CLASS 110.—Breeding Sow, farrowed before 1891 .	7	3	
CLASS 111.—Pen of two Breeding Sows, farrowed in 1891	7	3	
CHAMPION PRIZES.			
Given by Messrs. Wm. Lewis & Son, 'Bath Herald.'			
For the Best Boar in any of the Classes .	5		
For the Best Sow ditto .	5		

* The Judges will be empowered to award 3rd Prizes in any of the Pig Classes where there is sufficient merit.

WOOL.	First Prize.		Second Prize.		Third Prize.		Fourth Prize.	
Given by the Somerset Agricultural Association.	£	s.	£	s.	£	s.	£	s.
CLASS 112.—Three Devon Long-Wool Fleeces, of the Clip of 1891 . . .	5	0	2	0				
CLASS 113.—Three Somerset and Dorset Horn Fleeces of the Clip of 1891 .	5	0	2	0				
The Fleeces may be shown washed or unwashed as the Exhibitor prefers, but, if washed, it must have been done in the usual manner, on the Sheep's back.								
CHEESE.*								
The 1st and 2nd Prizes in Class 114 are given by Messrs. Wm. Lewis and Son, 'Bath Herald.'								
CLASS 114.—Four Cheeses, made in 1890, not not less than 70 lbs. each .	20	0	10	0	4	0	2	0
The Prizes in Class 115 are given by the Somerset Agricultural Association.								
CLASS 115.—Four Cheeses made in 1890, not more than 56 lbs. each . .	8	0	4	0	3	0	2	0
CLASS 116.—Four Cheeses made in 1891, not less than 30 lbs. each . .	5	0	4	0	3	0	2	0
CLASS 117.—Ten Loaf or other Truckle Cheeses, made in 1891 . .	4	0	3	0	2	0	1	0
CLASS 118.—5 Cream or other Soft Cheeses .	3	0	2	0	1	0	0	10
The Prizes in Classes 119 and 120 are confined to Students who have received not less than a week's instruction in the Society's Cheese School at Wells or Frome.								
CLASS 119.—Four Cheddar Cheeses made in 1890, the total weight being not less than 2 cwt. . .	10	0	8	0	6	0	4	0
CLASS 120.—Four Cheddar Cheeses made in 1891, not less than 30 lbs. each	5	0	4	0	3	0	2	0
EXTRA PRIZE.								
Given by Bath Local Committee.								
Best Exhibit in Class 119 or 120, Plate value	10	0						
CHAMPION PRIZE.								
Given by Bath Local Committee.								
Best Cheese Exhibit in any of the Classes, Plate value . .	10	0						

* A Fifth Prize may be given in any Dairy Class in which there are twenty Exhibitors, and additional Prizes, at the discretion of the Stewards and Judges, when that number is exceeded.

BUTTER AND CREAM.*	First Prize.	Second Prize.	Third Prize.	Fourth Prize.
	£ s.	£ s.	£ s.	£ s.
The Prizes in Class 121 are given by the Somerset Agricultural Association.				
CLASS 121.—3 lbs. of Fresh (or very slightly salted) Butter, in pound plain rolls or brick-shapes, made of cream from cows other than Channel Island Breeds . .	5 0	4 0	3 0	2 0
CLASS 122.—3 lbs. of Fresh (or very slightly salted) Butter, in pound plain rolls or brick-shapes, made of cream from Cows of Channel Island Breeds only . . .	4 0	2 0	1 0	0 10
CLASS 123.—3 lbs. of Fresh (or very slightly salted) Butter, in pound plain rolls or brick-shapes, made by Students who have attended a course of instruction at any of the Society's Butter Schools	5 0	4 0	3 0	2 0
EXTRA PRIZE.				
Given by Bath Local Committee.				
Best Exhibit in Class 123, Plate value	5 0			
CLASS 124.—12 lbs. of Salted Butter, in a jar or crock, to be delivered to the Secretary four weeks before the Show	4 0	2 0	1 0	0 10
CHAMPION PRIZE.				
Given by Bath Local Committee.				
Best Butter Exhibit in any of the Classes, Plate value . .	5 0			
The 1st and 2nd Prizes in Class 125 are given by the Somerset Agricultural Association.				
CLASS 125.—4 half-lbs. of Clotted or Devonshire Cream, packed either in tins or earthen jars . . .	2 0	1 0	0 10	

* A Fifth Prize may be given in any Dairy Class in which there are twenty Exhibitors, and additional Prizes, at the discretion of the Stewards and Judges, when that number is exceeded.

BUTTER-MAKING COMPETITIONS.*	First Prize.		Second Prize.		Third Prize.		Fo[illegible]	
	£	s.	£	s.	£	s.	£	
(To take place in the Working Dairy in the Showyard. Not open to Makers or Vendors of Churns or their assistants, or to any previous winner of the Society's Champion Gold Medal.)								
CLASS 126.—Best and largest quantity of Butter, made from a given quantity of cream, in the cleanest and most approved style, on the 1st day of the Show, by Students who have attended a course of instruction at any of the Society's Butter Schools . . .	5	0	4	0	3	0	2	(
Extra Prize given by Bath Local Committee to winner of 1st Prize in Class 126, Plate value	3	0						
The 1st Prize in Class 127 is given by the Somerset Agricultural Association.								
CLASS 127.—Best and largest quantity of Butter, made from a given quantity of cream, in the cleanest and most approved style, on the 2nd day of the Show, open to any woman without restriction as to School	5	0	4	0	3	0	2	0
Extra Prize given by Bath Local Committee to winner of 1st Prize in Class 127, Plate value	3	0						
CLASS 128.—Best and largest quantity of Butter, made from a given quantity of cream, in the cleanest and most approved style, on the 3rd day of the Show, open to any man or woman, except the winner of the 1st Prize in Class 127 .	5	0	4	0	3	0	2	0
Extra Prize given by Bath Local Committee to winner of 1st Prize in Class 128, Plate value	3	0						
CLASS 129.—Best and largest quantity of Butter, made from a given quantity of cream, in the cleanest and most approved style, on the 4th day of the Show, open to any man or woman, except the winners of the 1st Prizes in Classes 127 and 128	5	0	4	0	3	0	2	0
Extra Prize given by Bath Local Committee to winner of 1st Prize in Class 129, Plate value	3	0						

* A Fifth Prize may be given in any Butter-making Class in which there are twenty Competitors, and additional Prizes at the discretion of the Stewards and Judges, when that number is exceeded.

BUTTER-MAKING COMPETITIONS—*continued.*	First Prize.		Second Prize.		Third Prize.		Fourth Prize.	
	£	s.	£	s.	£	s.	£	s.
CHAMPION PRIZES.								
The following Prizes will be competed for on the 5th day of the Show by the winners of Prizes in Classes 126, 127, 128 and 129:—								
1st Prize—A Gold Medal and Certificate.								
2nd „ A Silver Medal and Certificate.								
3rd „ A Bronze Medal and Certificate.								
Extra Prizes, given by Bath Local Committee, will be placed at the disposal of the Judges for any Butter-making Competition on the 5th day of the Show, to the value in Plate of . .	8	0						
DAIRY APPLIANCES.								
CLASS 130.—A Gold Medal is offered for the best appliance for determining the amount of Butter Fat in Milk.								
CLASS 131.—A Gold Medal is offered for the best appliance for testing the acidity in Milk.								
The following will be regarded as essential points in deciding upon the merits of the Exhibits in Classes 130 and 131, viz.:— Efficiency; simplicity in working; economy in cost; and suitability for use on small as well as large farms.								
HORSE-SHOEING COMPETITION.								
CLASS 132.—Best Shoeing of a Nag Horse by a Smith in the Showyard on the 3rd day of Show . . .	3	3	2	2	1	1		
Certificates of Commendation will also be awarded where deserved, and each winner of a Prize or Commendation will receive a pair of Models for Shoeing and a copy of Miles's "Plain Treatise on Horse-Shoeing." (See Special Regulations on p. lxx.)								

CONDITIONS AND REGULATIONS.

GENERAL.

Entries.

1. Exhibitors may make an unlimited number of Entries in each Class (except those for Cheese, Butter and Cream) at the following Fees, which must be paid when the Entries are made.

		Members.	Non-members.
Horses (including Horse Box)	for each Entry	10*s.*	.. 20*s.*
Cattle, Sheep and Pigs	do.	5*s.*	.. 15*s.*
Cheese, Class 114	do.	10*s.*	.. 20*s.*
Do. Classes 115 to 118	do.	5*s.*	.. 10*s.*
Do. Classes 119 and 120	do.	5*s.*	.. 5*s.*
Butter, Cream, and Butter-makers ..	do.	2*s.* 6*d.*	.. 5*s.*
Dairy Appliances	do.	5*s.*	.. 15*s.*
Wool	do.	5*s.*	.. 15*s.*

In the case of Entries for the Jersey Butter Test Medals, an additional Entry-fee of 21*s.* is payable. (See page lxx.)

Cheese Students can compete in Classes 119 and 120 at the reduced fee payable by Members—viz., 5*s.* for each Entry.

Entries should reach the Secretary on or before April 16; after that date and up to April 23, Entries will only be received *on payment of double fees* in each case.

2. The privilege of entering at the reduced Fees is limited (except in Classes 119 and 120) to Members of the Society, or of the Somerset Agricultural Association, elected on or before January 27, 1891, and subscribing not less than 1*l.* annually.

3. Where a Prize is offered for a *pair* or *pen* of animals, Single Entry-fees only are payable for each *pair* or *pen*, and only one Entry-form must be used.

4. All Entries must be made on the printed forms to be obtained of the Secretary (Thos. F. Plowman, 4, Terrace Walk, Bath), and in applying for Forms Exhibitors are requested to state how many Entries they wish to make of either Horses, Cattle, Sheep, or Pigs, as each Stock Entry must be made on a separate Form.

5. All Entry-forms must be signed by the Exhibitor or his Agent. Exhibitors are requested to carefully examine the List of Prizes and Conditions, as the Society cannot be responsible for any errors made by Exhibitors in their Entry-forms. An Exhibitor omitting to give information asked for on the Entry-form, with regard to the age, name, colour, sire, dam, &c., of an Animal, will be liable to have his Entry disqualified.

6. Unless otherwise stated, an Animal or Article cannot be entered in more than one Class.

7. All Animals or Articles exhibited must be *bonâ fide* the property of the Exhibitor at and from the time of Entry, and, in the case of an imported animal, the shipping certificate must be produced to the Secretary, in proof that the animal was in this country at the time of Entry.

Showyard.

8. The Yard will be open for the reception of Horses, Cattle, Sheep, Pigs and Wool, on Monday and Tuesday, June 1 and 2, from 7 A.M. to 6 P.M. Horses will also be received from 6 to 8 o'clock on the morning of the first day of Show, but all other Stock Entries must be in the Yard the previous day. Animals entered for the Jersey Butter-Test Prizes must be in the Yard by 6 P.M. on Monday, June 1. (*See Reg.* 48 *and* 49 *for Dairy Produce.*

Labels will be sent by the Secretary, and must be securely affixed to the head of each Animal, or, in the case of other exhibits, to the receptacle containing them.

9. All Exhibits and all persons in charge of the same, will be subject to the Orders, Regulations, and Rules of the Society.

10. All Exhibits, except Horses (see Conditions 27 and 28), must remain in the place allotted to them in the Showyard until 6 P.M. on the last day of Show.

11. No Animal can be permitted to be removed from its place without leave from the Steward of the Department, or can leave the Yard till the metal label denoting its number is given up to the Gatekeeper.

12. The Society, its Officers, and Servants, will not be liable for any errors or mistakes that may happen in placing or penning the Stock or Articles to be exhibited, but the Servants in charge of the same must see that they are placed or penned according to their Entries.

13. All Servants in charge of Stock must be in attendance each day during the Show at least a quarter of an hour before the time appointed for parading the animals in the Show-rings, and must take their animals into the ring when desired by the Stewards. Any infringement of this or any other rule will render the Exhibitor liable to a fine of 1*l.* by the Stewards, and to the forfeiture of any Prize he may be entitled to.

14. The Society will not, in any case, or under any circumstances, hold itself responsible for any loss, damage, misdelivery, illness or accident that may occur *through* or *to* any Exhibit; and it shall be a condition of entry that each Exhibitor shall hold the Society harmless, and indemnify it against any legal proceedings arising from any of the above-named circumstances.

15. Hay, straw, and green food will be delivered to the servants of Exhibitors free of expense at the Forage Stores in the Showyard, and they must take it to their respective Animals. Servants must apply at the Forage Stores for their Forage Tickets after they have brought their Animals into the Yard.

NOTE.—For the convenience of Exhibitors wishing to sell their Animals, a Register will be kept at the Secretary's Office, in which they may enter the prices.

DISQUALIFICATIONS.

16. No Animal that has competed in a Fat Stock Class in any Show shall be eligible to compete for the Prizes offered in this Prize Sheet.

17. No Animal which has taken a First Prize at any Meeting of this Society can compete again in the corresponding Class.

18. An Animal having any unsoundness likely to be transmitted to its progeny, shall be disqualified thereby from receiving any Prize offered by or through the Society.

19. If any wilful mis-statement, or misrepresentation, be proved to have been made by an Exhibitor, either in an Entry-form or otherwise, in connection with this or any Agricultural Society, the Council shall have power to withhold any Prize awarded to him, and to disqualify him from exhibiting at the Society's future Shows. (See also Regulation 5.)

PENALTIES.

20. As the non-exhibition of Animals entered for the Show causes unnecessary preparations and expense, and disarranges the Showyard, any person entering Stock, and failing to exhibit the same, shall pay a penalty of 10*s.* for each Entry, or be disqualified for exhibiting in future, unless the non-exhibition be caused by the death of the Animal or Animals, illness, or unavoidable injury.

21. Every Exhibitor will be required to undertake to forfeit and pay to the Society the sum of 20*l.*, as and for liquidated damages, if any Animal which he exhibits, be to his knowledge suffering from any contagious or infectious disease, and the Stewards are empowered to prevent the entry of any diseased Animal into the Yard, or to have it removed therefrom, if they should consider it desirable.

22. Stock Exhibitors will receive Admission Tickets for the Show for themselves and the Servants required to take charge of their Animals, and Exhibitors will be held responsible for their proper use. If a Ticket is transferred or otherwise improperly used it will be cancelled, and the Exhibitor will be required to pay a fine of 1*l.* Servants in charge of Stock at night must, if they leave the Yard, return before 10 P.M., or they will not be admitted.

Awards.

23. In all cases where Prizes are awarded *conditionally*, they will be withheld until the Exhibitor shall have proved to the satisfaction of the Council that the conditions have been complied with.

24. Except under a special recommendation from the Judges, no Second Prize will be given in any of the Classes unless there are three entries, and no Third Prize unless there are six entries.

25. The Certificate of the Veterinary Inspector, whether as to age or soundness, shall be required only in cases where the Judges are in doubt, or where a protest shall be delivered to the Secretary within the time prescribed by Condition No. 26. The decision of the Inspector in such cases shall be final and conclusive; and in case it shall be against the Animal to which a Prize has been awarded, such Animal shall be disqualified from receiving such Prize.

Protests.

26. Any protest must be lodged with the Secretary in the handwriting of an Exhibitor, or that of his representative, before 6 P.M. on the first day of the Exhibition, and no protest will be accepted without a deposit of 5*l.*, which sum will be forfeited at the discretion of the Stewards unless the protest is substantiated. Protests will be considered by the Disqualifying Committee, whose decision shall be final and conclusive.

APPLYING TO CERTAIN CLASSES ONLY.

Horses.

27. Horses can be removed from the Yard at night on deposit by the Exhibitor of 3*l.* at the Finance Office, which sum will be forfeited if the Horse does not return at 8 A.M. each day during the Exhibition.

28. The Stallions in Class 1 are not required to remain in the Yard longer than 6 o'clock in the evening of the third day of the Show.

29. Exhibitors must provide saddles for Horses in Classes 7, 12, 13, 14 and 15, as they are to be ridden; and vehicles and harness for those in Classes 16, 17 and 18, which are to be driven.

30. No Horse, unless a Foal, will be admitted into the ring without a proper bit.

31. The Prizes for Stallions in Class 1 will be withheld until a Certificate from the owner is delivered to the Secretary that the Horse has served at least 20 Mares during the current season.

32. In Classes 4 and 11, Mares shall be exhibited with their own foals at foot, or shall hereafter be certified to have produced a living Foal before the 1st of August of the year of the Show.

Cattle.

33. All Bulls must have a ring or clamp attached to the nose, and in the aged Classes must be provided with a strong chain. All Cattle must be properly secured to the satisfaction of the Officers of the Society, on being brought to the gate of the Yard, or they will not be admitted.

34. All Cattle will be required to be paraded in the ring at least once a day at the discretion of the Stewards.

35. No Bull above 2 years old will be eligible to receive a Prize until certified to have served not less than six different Cows (or Heifers), previous to June 1st, 1891, and it must be the sire of live calves dropped in the year 1890 or 1891.

36. No Cow will be eligible to receive a Prize until certified to have had a living Calf previous to the Show, or that the Calf, if dead, was born at full time within the twelve months preceding the date of the Show.

37. In the Classes for Heifers "in-Milk or in-Calf," no Heifer entered as in-Calf will be eligible to receive a Prize until certified to have produced a living Calf before March 1st, 1892, or that the Calf, if dead, was born at full time before that date.

38. Every Cow of the Jersey and Guernsey breeds and in the Dairy Class entered as in-Milk shall be milked dry in the Showyard on the evening preceding the day of judging, in the presence of an officer of the Society appointed for the purpose.

39. Any Animal in the Cattle Classes found to be artificially coloured will be disqualified.

40. Any person selling Milk in the Yard, except in the place appointed by the Stewards, will be fined 5*s*. for each infringement of this Regulation.

Sheep.

41. All Sheep over one year old must have been really and fairly shorn bare on or after the 1st of April in the year of the Exhibition. Inspectors will be appointed by the Council to examine Sheep on their admission to the Showyard, with instructions to report to the Stewards any cases in which this has not been done.

42. Each pen of Ewes must be of the same Flock. No Exhibitor shall enter in the Leicester and any other Long-wool Classes from the same Flock.

Pigs.

43. The two Sow Pigs in each pen must be of the same litter.

44. All Sows farrowed before 1891 shall be certified to have had a litter of live Pigs within six months preceding the first day of exhibition, or to be in-Pig at the time of entering, so as to produce a litter of Pigs, farrowed at their proper time, before the 1st of September following. In the case of in-Pig Sows the Prize will be withheld until the Exhibitor shall have furnished the Secretary with a certificate of farrowing as above.

45. All Pigs exhibited with a Sow shall be her own produce, of the same litter, and not exceeding two months old at the time of the Show.

46. No Sow above 18 months old that has not produced a litter of live Pigs shall be eligible to compete in any of the Classes.

47. Any animal in the Pig Classes found to be artificially coloured will be disqualified.

Cheese, Butter and Cream.

48. Cheese will be received in the Yard on Monday, June 1, from 7 A.M. to 6 P.M., and on Tuesday, June 2, from 7 to 10 A.M. All Cheese must be in its proper place in the Showyard by 10 o'clock on Tuesday morning, June 2nd, as the judging of Cheese will take place on that day.

49. Butter and Cream will be received in the Yard on Monday and Tuesday, June 1 and 2, from 7 A.M. to 6 P.M., and from 6 to 8 A.M. on Wednesday, June 3.

50. No Exhibitor shall make more than two entries in any one class of Cheese, or more than one entry in any one class of Butter or Cream. The Cheese, Butter or Cream must in every case have been made in the Exhibitor's own Dairy by himself, his family or his servants.

51. Any Cheese bored or marked will be disqualified. Any distinctive mark on the Butter or its cloth will disqualify.

52. The winners of First Prizes in the Cheese Classes will have to give one Cheese (which the Judges will select) to the Council for public disposal. The First Prize lots of Butter and Cream will be the property of the Council for public disposal. Other Exhibitors of Butter and Cream will have to give 1 lb. from each Exhibit for public tasting; and endeavour will be made to prevent damage to the Exhibits then remaining.

53. Exhibitors must very carefully answer the questions on the Entry-forms.

54. Exhibitors must make their own arrangements for the return of their Exhibits, as the Society cannot undertake this.

Butter-Making Competitions.

55. Cream will be supplied free of charge, and the Butter will be the property of the Society.

56. The Society will supply Competitors with churns, &c., or they can bring their own appliances, if they prefer to do so.

57. Competitors who work the Butter with their hands will be disqualified.

58. No previous winner of the Society's Champion Gold Medal is eligible to compete for any Prize given in the Butter-making Competitions in the Showyard.

Horse-Shoeing Competition.

59. All Entries must be made on the printed forms to be obtained of the Secretary, and must reach him on or before May 19, 1891. The Entry Fee is 5s., which must be sent with the Entry.

60. The competition will take place on Friday, June 5, 1891, at 10 o'clock, at which hour Competitors must attend at the Secretary's Office in the Showyard.

61. Each Competitor must make and fix a fore-shoe in the Showyard, having previously taken off the old Shoe.

62. A Competitor must bring his own Tools and a Striker, but the Society will provide Forges, Anvils, Flat Iron, Nails, and Fuel.

63. All Shoes must be fullered.

64. No Man who has already won a First Prize given by the Society for Horse-Shoeing will be eligible to compete again.

ADJUDICATION OF PRIZES FOR LIVE STOCK.

By the Bye-Laws of the Society the Judges are instructed:—

1. Not to award any Prize or Commendation unless the animal possesses sufficient merit.

2. Not to award a Prize to any Horse or Mare, unless it is free from unsound-

ness likely to be transmitted to its progeny; or if a Gelding, unless free from unsoundness (an accident having temporary consequences only excepted).

3. In awarding Prizes to Cattle, Sheep, and Pigs, to decide according to the relative merits of the animals for Breeding purposes, and not to take into consideration their present value to the butcher.

4. To record the number of any animals which may in their opinion be possessed of sufficient merit to succeed to vacancies caused by disqualification. Animals so placed in a Reserved List shall, in the event of any case of disqualification, succeed to the Prize or Prizes according to the Judges' award.

Should any question arise which the Judges may desire to refer to another tribunal, the Stewards of Stock shall assist them in providing a Referee.

RAILWAY ARRANGEMENTS.

The Railway Companies agree to the following arrangements for the CONVEYANCE OF STOCK to and from the Show:—

1. Stock to be charged full rates to the Show, but half rates on the return journey at owner's risk if unsold, and on production of a Certificate to that effect from the Secretary of the Society. The reduction to half rate is allowed only when the Stock is returned to the same Station as that from which it was conveyed to the Show and by the same route.

2. Men certified by the Exhibitor to be *bonâ fide* in charge of Stock to be conveyed free, providing that they travel in the same train as the Animals; the number not to exceed one man to each vehicle.

3. The foregoing regulations to apply to Animals whether carried in horse boxes by passenger or special train, or in cattle trucks by luggage trains. The concession as to Animals in horse boxes is granted only on the condition that the present orders of the Board of Agriculture, under which the Companies are not required to disinfect horse boxes, remain in force. If the unsold Stock, which was conveyed on the Outward Journey by Goods Train in Cattle Trucks, be required to be returned by Passenger Train in Horse Boxes, half the Passenger rates will be charged, and *vice versâ*.

In accordance with a recent arrangement, the Railway Companies will provide specially constructed covered Cattle Trucks at a reduced rate of charge, further proportionate reduction being made when more than one Animal is carried.

To insure prompt delivery of Stock, Exhibitors are recommended to ascertain the *proper time for loading* from the Superintendent or Booking Clerk at the Station from which their Stock is intended to be despatched.

BATH MEETING,

JUNE 3, 4, 5, 6 AND 8, 1891.

PRIZES FOR POULTRY.

Section 1.—GENERALLY USEFUL BREEDS.	First Prize.	Second Prize.	Third Prize.
CLASS	£ s.	s. d.	s.
1.—COCHINS (Cinnamon and Buff)—Cock	1 10	15 0	5
2.—Ditto—Hen	1 10	15 0	5
3.—COCHINS (Partridge-Feathered or White)—Cock	1 10	15 0	5
4.—Ditto—Hen	1 10	15 0	5
5.—BRAHMAS (Dark)—Cock	1 10	15 0	5
6.—Ditto—Hen	1 10	15 0	5
7.—BRAHMAS (Light)—Cock	1 10	15 0	5
8.—Ditto—Hen	1 10	15 0	5
9.—LANGSHANS—Cock	1 10	15 0	5
10.—Ditto—Hen	1 10	15 0	5
11.—PLYMOUTH ROCKS—Cock	1 10	15 0	5
12.—Ditto—Hen	1 10	15 0	5
13.—WYANDOTTE—Cock	1 10	15 0	5
14.—Ditto—Hen	1 10	15 0	5
15.—CHICKENS OF 1891 (Cochin, Brahma, Langshan, Plymouth Rock, or Wyandotte)—Cockerel	1 10	15 0	5
16.—Ditto—Pullet	1 10	15 0	5
Section 2.—LAYING OR NON-SETTING BREEDS.			
17.—SPANISH—Cock	1 10	15 0	5
18.—Ditto—Hen	1 10	15 0	5
19.—MINORCAS—Cock	1 10	15 0	5
20.—Ditto—Hen	1 10	15 0	5
21.—LEGHORNS (Any Variety)—Cock	1 10	15 0	5
22.—Ditto—Hen	1 10	15 0	5
23.—ANDALUSIANS—Cock	1 10	15 0	5
24.—Ditto—Hen	1 10	15 0	5
25.—HOUDANS—Cock	1 10	15 0	5
26.—Ditto—Hen	1 10	15 0	5
27.—POLISH FOWL—Cock	1 10	15 0	5
28.—Ditto—Hen	1 10	15 0	5
29.—HAMBURGS (Golden Spangled)—Cock	1 10	15 0	5
30.—Ditto—Hen	1 10	15 0	5
31.—HAMBURGS (Silver Spangled)—Cock	1 10	15 0	5
32.—Ditto—Hen	1 10	15 0	5
33.—HAMBURGS (Golden Pencilled)—Cock	1 10	15 0	5
34.—Ditto—Hen	1 10	15 0	5
35.—HAMBURGS (Silver Pencilled)—Cock	1 10	15 0	5
36.—Ditto—Hen	1 10	15 0	5
37.—HAMBURGS (Black)—Cock	1 10	15 0	5
38.—Ditto—Hen	1 10	15 0	5
39.—CHICKENS OF 1891 (Spanish, Minorca, Leghorn, Andalusian, Houdan, Polish, or Hamburg)—Cockerel	1 10	15 0	5
40.—Ditto—Pullet	1 10	15 0	5

Section 3.—BREEDS SUITABLE FOR THE TABLE.	First Prize.	Second Prize.	Third Prize.
	£ s.	s. d.	s.
CLASS			
41.—DORKINGS (Coloured)—Cock	1 10	15 0	5
42.—Ditto—Hen	1 10	15 0	5
43.—DORKINGS (Silver Grey)—Cock	1 10	15 0	5
44.—Ditto—Hen	1 10	15 0	5
45.—DORKINGS (White or Cuckoo)—Cock	1 10	15 0	5
46.—Ditto—Hen	1 10	15 0	5
47.—GAME (Black-Breasted Reds)—Cock	1 10	15 0	5
48.—Ditto—Hen	1 10	15 0	5
49.—GAME (Brown-Breasted Reds)—Cock	1 10	15 0	5
50.—Ditto—Hen	1 10	15 0	5
51.—GAME (Pile or any other Variety)—Cock	1 10	15 0	5
52.—Ditto—Hen	1 10	15 0	5
53.—MALAYS—Cock	1 10	15 0	5
54.—Ditto—Hen	1 10	15 0	5
55.—INDIAN GAME—Cock	1 10	15 0	5
56.—Ditto—Hen	1 10	15 0	5
57.—ANY OTHER DISTINCT VARIETY NOT MENTIONED—Cock	1 10	15 0	5
58.—Ditto—Hen	1 10	15 0	5
59.—CHICKENS OF 1891 (Dorking, Game, Malay, Indian Game, or any other Variety not mentioned)—Cockerel	1 10	15 0	5
60.—Ditto—Pullet	1 10	15 0	5
61.—CHICKENS OF 1891 (either pure-bred or cross-bred)—Two Cockerels	1 10	15 0	5
62.—CHICKENS OF 1891 (either pure-bred or cross-bred)—Two Pullets	1 10	15 0	5
Section 4.—DUCKS, GEESE AND TURKEYS.			
63.—DRAKE OR DUCK (Rouen or Aylesbury)	1 10	15 0	5
64.—Ditto (Pekin)	1 10	15 0	5
65.—COUPLE OF DUCKLINGS—(Any Pure or Cross Bred Variety)	1 10	15 0	5
66.—GANDER OR GOOSE (Any Variety)	1 10	15 0	5
67.—TURKEYS—Cock or Hen	1 10	15 0	5
Section 5.—FANCY BREEDS.			
68.—BANTAMS (Black or White)—Cock	1 0	10 0	5
69.—Ditto—Hen	1 0	10 0	5
70.—BANTAMS (Game, any Variety)—Cock	1 0	10 0	5
71.—Ditto—Hen	1 0	10 0	5
72.—BANTAMS (Any other distinct Variety)—Cock	1 0	10 0	5
73.—Ditto—Hen	1 0	10 0	5

POULTRY.

CONDITIONS AND REGULATIONS.

Charges, &c.

1. Exhibitors may make an unlimited number of Entries in each Class on payment of fees as follows:—

Classes 1 to 67 inclusive	5*s.* per entry.
Classes 68 to 73 inclusive	3*s.* per entry.

The above fees include coops, food, and attendance.

N.B.—The above Fees *must* be sent with the Entries, or no notice will be taken of the latter.

2. All entries must be made on the printed forms, to be obtained of the Secretary (Thomas F. Plowman, 4, Terrace Walk, Bath), and such forms must be correctly filled up and returned to the Secretary, together with all fees due, on or before May 6th. Exhibitors are requested to carefully examine the List of Prizes and Conditions, as the Society cannot be responsible for any errors made by Exhibitors in the Entry forms, and birds entered in a wrong Class will be necessarily excluded from competition. No alterations can be made in Entry forms after they have been received by the Secretary.

3. The Council reserve the right to refuse the entries of any person.

4. Exhibitors must state the price, breed, and age of their birds on their Entry forms.

Showyard.

5. All birds must be in the Showyard *on Tuesday, June 2nd,* and no bird can be removed before Monday, June 8th, at 7 P.M.

6. All carriage must be pre-paid to Bath Railway Station, otherwise the birds will not be received at the Exhibition; but they will be conveyed free of expense from the Station to the Showyard and back.

7. No Exhibitor or Servant will be allowed into the Tent until the Birds have been judged.

8. The Poultry Tent will not be open to the public until 2 o'clock on the 1st day of the Exhibition.

9. One admission ticket, available whenever the Show is open to the public, will be given to each Exhibitor whose Entry-Fees amount to 1*l.* and upwards.

Table Poultry.

10. In Classes 61 and 62, quality for the table will be considered before mere weight. The date of hatching must be given, and, in the case of cross-bred birds, the breeds of the parents.

Sales.

11. All birds may be claimed at the price put upon them, any time after 4 o'clock on Wednesday, June 3rd, and a sale *must take place* if the price stated be paid to the Clerk in the Poultry Office at the time of claiming. *No alteration can be made in the prices stated on the Entry Forms* and in the Catalogue until after Friday, June 5th, when the price may be reduced on payment to the Stewards of 1*s.* per Pen on each alteration. Birds must be *sold in pens,* and the price stated must include the basket. A charge of 10 per cent. will be made for all birds sold. The persons who have the management of the sales cannot take charge of birds which are disposed of privately.

Disqualifications.

12. The Judges are empowered to withhold a prize or prizes where birds are not considered of sufficient merit, or to disqualify any that have been clipped, drawn, trimmed, marked, or dyed, and an Exhibitor detected in a false statement as to the age, &c., of any bird, or in any other practice calculated to deceive or mislead the Judges or Stewards, shall forfeit all or any prizes awarded to him or her at the Show, and will be disqualified from competing at any future Show of the Society.

13. Unhealthy birds will not be exhibited, but will be immediately returned to their owners, and the fees forfeited.

Protests.

14. In order to check frivolous and vexatious protests, no protest will be entertained unless accompanied by a deposit of 1*l.* in each case; and in case the protest is not substantiated, the deposit may be forfeited to the funds of the Society. All protests must be made before 12 o'clock (noon) on Thursday, June 4th.

Forfeits.

15. Persons entering birds, and failing to send the same to the Exhibition, will forfeit the entrance fee for each pen so left vacant.

General.

16. All birds shown must be *bonâ fide* the property of the Exhibitor.

17. For each pen entered, the Exhibitor will receive a Label, on the reverse side of which he must legibly write his name and address for the return journey.

18. All Eggs laid at the Exhibition will be destroyed.

19. The Stewards pledge themselves to take every care of the birds exhibited, but neither they nor the Society will in any case be responsible for any accident, loss, or damage, from whatever cause arising, the exhibits being entered at the sole risk of the Exhibitors, and Exhibitors will be required to hold the Society harmless in the event of loss.

20. In case of death of any bird during the Exhibition, it will be sent back for the inspection of the Exhibitor.

21. The Poultry Department is subject to the rules and regulations of the Society and its officers.

*** *The use of properly-constructed poultry baskets will facilitate the safe and speedy conveyance of the specimens to and from the Exhibition.*

The Society cannot, under any circumstances, undertake to send telegrams to Exhibitors as to Judges' awards.

Applications for Catalogues (price 1*s. each) and printed lists of awards should be made to the Publishers,* Messrs. Lewis and Sons, *Herald Office, Bath.*

BATH MEETING,

JUNE 3, 4, 5, 6 AND 8, 1891.

REGULATIONS

FOR THE EXHIBITION OF

IMPLEMENTS, MACHINERY, SEEDS, CATTLE FOODS, ARTIFICIAL MANURES, FARM PRODUCE,

AND

MISCELLANEOUS ARTICLES.

CHARGES, &c.

1. All Entries, together with all amounts due, must reach the Secretary on or before March 24th, 1891, but the Society's arrangements will be facilitated by their receipt previous to this date. All Entries are received subject to approval by the Council of the Society, and must be made on the authorised forms, to be obtained of the Secretary.

2. Every Exhibitor, not being a Member of the Society, subscribing at least 1*l.* annually, will be required to pay an Entry-fee of 10*s.*, in addition to the charge for Space, in accordance with the following rates:—

	£	s.	d.
Machinery in Motion Shedding, for Machinery worked by steam, gas, electricity, or other power. For each compartment (20 feet deep, 14 feet wide, and 10 feet high at the eaves) ..	3	15	0
Ditto, ditto, with space for elevator behind	4	0	0

The above charges include the cost of a special frame work provided by the Society for Exhibitors' names. (See Regulation 7.)

No charge will be made for space in front of the "Machinery in Motion" Shedding required for the Engine employed to drive the Machines placed therein; but if space is required for Machinery, other than Elevators, behind the Machinery in Motion Shedding, it must be applied for, and if available will be allotted and charged at 1*s.* per square yard.

Exhibitors requiring a greater height than 10 feet must make special application.

	£	s.	d.
Ordinary Shedding, for such Implements and Machines *only* as are strictly Agricultural in their character, 20 feet deep, and 7 feet high at the eaves (not less than 10 feet run will be allotted, but after that it can be taken in lengths of 5 feet each), at per foot run	0	2	0
N.B.—Exhibitors in Ordinary Shedding who desire to exhibit also in Miscellaneous can have 10 feet or more of the latter annexed to their Ordinary Shedding.			
Seed Shedding, for Seedsmen only, 18 feet deep, and 8 feet 6 inches high at the eaves (not less than 10 feet run will be allotted), at per foot run	0	5	0
Boarded Shedding, boarded at the back, for Cattle Foods, Cattle Medicines, Artificial Manures, and Farm Produce, 18 feet deep, and 8 feet high at the eaves (not less than 10 feet run will be allotted), at per foot run	0	7	6
Miscellaneous Shedding, for Carriages, Horticultural Implements, and all other Articles *not strictly Agricultural in their character*, 20 feet deep, and 7 feet high at the eaves (not less than 10 feet run will be allotted, but after that it can be taken in lengths of 5 feet each), at per foot run	0	7	6
Uncovered Ground for buildings (but nothing to be exhibited under them) and articles too high to go under Shedding (not less than 180 square feet must be paid for), at per square foot ..	0	0	2

3. A charge of 6*d.* per line is made for inserting in the published Catalogue the descriptions of their goods given by Exhibitors on the Specification Forms. Ten words count as one ordinary line; but any portion of a line which finishes a description must be counted as one line. A fresh line must be begun in describing each article, and no line must be reckoned at less than 6*d.* Two numerals count as one word. This charge must be paid to the Secretary with the other fees and charges at the time of making the entry.

SHOWYARD.

4. The Yard will be open for the reception of Articles intended for Exhibition from 7 A.M. to 6 P.M. on Monday, May 25th, and following days, up to and including Thursday, June 2nd.

5. Every Implement or other Article when presented at the gate of the Showyard must have on it a Label bearing in legible characters the name of the Exhibitor, the number of his Shed and Stand, and the number of the Article. Exhibitors must state on their Entry Forms the number of labels required, and they will then be supplied by the Secretary. Articles not so labelled will be refused admission.

6. All Articles must be arranged in the Sheds so that they may be seen from the space between the shedding. No article will be allowed to project or be placed outside any but the Machinery in Motion Shedding.

7. In the Machinery in Motion Shedding it has been arranged, for the sake of greater prominence and to allow room for the straps from the engines, that Exhibitors' names shall be placed above the level of the eaves, and 3 feet in advance of them. A special frame-work 3 feet deep will be provided (without

further charge) by the Society for this purpose. The names provided by the Exhibitors may be of any colour and material, but must be of the uniform depth of 3 feet.

8. No signs are to be fixed at the ends of the sheds so as to project beyond the Exhibitors' frontage, or the slope of the gable, nor are any to be fixed on the ridge of the sheds. Exhibitors must not close the ends or any part of their shedding by boards or otherwise.

9. Any Exhibitor damaging the shedding or canvas, either by forcing any Article of more than 7 feet in height under it, or by any other means, will incur a penalty of 40*s.*, and the Stewards shall have power to remove his Exhibits from the Yard.

10. If flag-poles are used they must not be placed more than one foot from the Shedding or be attached to any part of it.

11. No fire, except gas, will be allowed under Shedding of any description.

12. Exhibitors requiring gas must make their own arrangements for its supply.

13. Coke or Anthracite Coal will alone be allowed as Fuel, and this must be bought in the Yard from the Coal Contractor appointed by the Society.

14. Any Article on which the paint or varnish is not perfectly dry by 8 o'clock on the first morning of the Exhibition shall be removed at once from the Yard at the cost of the Exhibitor, and a penalty of 20*s.* will be incurred for every such article.

15. Exhibitors must provide, at their own cost, whatever they may require for exhibiting their Machines in motion in the Yard.

16. Exhibitors will not be allowed to bring any vehicle into the Yard after 9 A.M. during the days of Exhibition.

17. Exhibitors will be required to furnish to customers giving orders in the Yard the articles exhibited by them, and also others of equal quality, material, and manufacture, ordered at the Exhibition, at prices not exceeding those entered in their specifications.

18. Exhibitors subletting any portion of the space allotted to them shall be subject to a penalty of 40*s.*; and shall, with the person hiring the same, be expelled from the Yard.

19. No Exhibitor will be permitted to exhibit, sell, or offer for sale, any article except at the Stand allotted to him, and there only the articles he has entered on his Specification Form.

20. No Exhibitor or other person will be allowed to affix any placard or advertisement to any part of the Society's plant or premises, nor will any person be allowed to distribute handbills except in his own Stand.

21. The Stewards shall have power to expel from the Yard any Exhibitor or his representative who shall call attention to his goods in such a manner as to cause annoyance.

22. The Society will supply, in accordance with a scale of charges to be obtained of the Secretary, such fittings, &c., as may be required by Exhibitors at their Stands, provided notice is given to the Steward of Works, at the Showyard, at least one week previous to the opening of the Exhibition to the public, such fittings, &c., remaining the property of the Society after the Exhibition. Only the Society's workmen or materials will be allowed in the Showyard, except under special arrangement with the Steward of Works.

23. No Article will be permitted to be removed from the Exhibition till Tuesday, June 9th.

24. Tickets of admission to the Exhibition, each being available for either a Member of the Exhibitor's Firm or any one employed by it, will be forwarded to Exhibitors from the Secretary's Office in the proportion stated below. No Tickets in excess of this number will be issued under any circumstances, except in the case of a Member of the Society, who will receive his usual Member's Ticket in addition. An Exhibitor will be held responsible for their proper use. If a Ticket is transferred, or otherwise improperly used, it will be cancelled, and the Exhibitor will be required to pay a fine of 1*l*.

MACHINERY IN MOTION SHEDDING.

4 Tickets	if 1	compartment	is taken.
6	„ 2	compartments	are taken.
8	„ 3	„	„

ORDINARY, SEED, BOARDED, AND MISCELLANEOUS SHEDDING.

3 Tickets	if 10	feet	are taken.
5	„ 20	„	„
6	„ 30	„	„
7	„ 40	„	„
8	„ 50	„	„
9	„ 60	„	„
10	„ 70 and upwards.		

UNCOVERED GROUND.

3 Tickets	if 180	square feet	are taken.
4	„ 270	„	„
5	„ 450	„	„
6	„ 630	„	„
8	„ 900 and upwards.		

25. No Badges are allowed to be worn in the Showyard, except the official Badges of the Society.

26. Exhibitors' Servants working in the Yard will be admitted without Tickets up to and (with the exception of Sunday) including the day previous to the opening of the Exhibition, provided they are accompanied by, or produce a written authority from, an Exhibitor or his Representative, to whom an Admission Ticket has been issued.

27. All persons and articles entering the Exhibition will be subject to the Orders, Rules, and Regulations of the Council, and of the officers appointed by them.

28. The Council of the Society will not be in any way responsible with regard to any article entered or exhibited; and it shall be a condition of entry that each Exhibitor shall hold the Society harmless and indemnify it against any legal proceedings that may arise from the loss, damage, or mis-delivery of any article.

29. All fines, fees, and charges shall be recoverable by the Secretary.

Railway Arrangements.

Implements, &c., are subject to the usual full charges for carriage, both going to and returning from the Exhibition, excepting only such Implements of Husbandry as remain unsold, and are returned by goods trains to the stations whence sent, AT OWNER'S RISK. These will be charged half rates on the return journey—provided they are returned by the same route as that by which they went to the Exhibition—upon production of a Certificate from the Secretary that they are really unsold.

To insure prompt delivery, Exhibitors are recommended to ascertain the *proper time for loading* from the Superintendent or Booking Clerk at the Station from which their Implements are intended to be despatched.

BATH MEETING,

JUNE 3, 4, 5, 6 AND 8, 1891.

ARTS DEPARTMENT.

REGULATIONS.

1. This Gallery is for the exhibition of Modern Works of Art by artists and amateurs.

2. Exhibitors must fill up the annexed form and return it to the Secretary, THOS. F. PLOWMAN, 4, Terrace Walk, Bath, on or before May 9th, 1891.

3. Every picture must be sent framed, and must have a Label attached. Labels for the purpose may be obtained from the undermentioned Society's agents or from the Secretary.

4. For the convenience of Artists the Committee have appointed the following Agents, with whom Pictures may be left not later than May 9th, 1891 :—

BATH . . .	F. M. Dormer, 4, Prince's Buildings.
BIRMINGHAM .	J. Collier, 66, New Street.
BRISTOL . .	Frost & Reed, Clare Street.
CLIFTON . .	Frost & Reed, Triangle.
EXETER . .	T. B. Worth & Co., Cathedral Yard.
LONDON . .	Dicksee & Co., Rose and Crown Yard, King Street, St. James's, S.W.
PLYMOUTH . .	Harris & Sons, 197, Union Street.

5. All works selected by the Committee for exhibition will be forwarded to the Society's Picture Gallery, and will be returned at the close of the Exhibition to the Agents free of charge. Exhibitors will be required to remove their Pictures, selected or otherwise, from the Agents at their own cost. The works, however, of artists specially invited by the Committee will be collected and returned to their respective studios by the Agents, free of all expense.

6. Pictures may be sent direct to the Exhibition for selection, addressed to THOS. F. PLOWMAN, Secretary, Picture Gallery, Bath and West and Southern Counties Society, Bath, on or before May 23rd. They must be forwarded in packing-cases, carriage paid, and they will be returned at the cost and risk of the sender.

Printed direction Labels may be obtained on application to the Secretary. The name and address of the sender should be written on the inside of the packing-case.

7. No work can be removed from the Picture Gallery until Thursday, June 11th, without special permission.

8. A commission of 5 per cent. upon the Catalogue price will be charged upon all works sold whilst in the possession of the Committee.

9. The utmost care will be taken of all works sent for exhibition, but the Committee will not be responsible for any loss or damage incurred whilst the works are in their possession or in transit to or from the Exhibition.

ART UNION.

(*Under the sanction and regulation of Her Majesty's Privy Council.*)

In order to promote as far as possible the disposal of Works of Art, the Society holds an ART UNION, the Prizes being selected from the Pictures for sale in the Society's Gallery at Bath. Prizes will be given to the amount realised by the sale of tickets, and in addition thereto the Council of the Society have made a special grant of 100*l.* to be likewise distributed in Prizes. The Public Drawing will take place at the Exhibition on Monday, June 8th, 1891.

Shares, One Shilling each, can be obtained of the Society's Agent (see list in Regulation 4), *or of the Secretary,* 4, *Terrace Walk, Bath.*

BATH MEETING,

JUNE 3, 4, 5, 6 AND 8, 1891.

ART-MANUFACTURES DEPARTMENT.

The Arts-Manufactures Gallery is a substantially constructed, well-lighted building, with a metal roof and boarded floor, and is specially designed for the exhibition and sale of such works as those included under the following heads:—

Cabinet Work, Artistic Furniture.
Mural Decorations:—Papers, Tiles, Panels, Mosaics, Curtains, Tapestry.
Models, Casts, Carvings, Bronzes.
Paintings on China, Glass, Terra-cotta.
Art-Needlework.
Glass, Porcelain, Pottery.
Ornamental Metal Work.
Bookbinding.
Engravings, Photographs.
Musical Instruments.
Jewellery, Gold and Silversmiths' Work, Clocks and Watches.
Scientific Instruments.

REGULATIONS.

1. Applications for space, together with the fee, must reach the Secretary (THOS. F. PLOWMAN), 4, Terrace Walk, Bath, on or before March 25th, but, the space being limited, as the Gallery cannot be enlarged, applications should be sent as early as possible. If space cannot be allotted, the fee will be returned. Cheques and Postal Orders should be made payable to T. F. Plowman.

2. A charge is made for space at the rate of 6*s*. per foot run for Side Space, 4 feet wide, and 12*s*. per foot run for Centre Space, 8 feet wide; the available height being 9 feet in each case. Not less than 6 feet run will be allotted. These charges do not include cost of counters and fittings.

3. The Council reserve to themselves the right to refuse the admission of any article which they may consider to be ineligible.

4. The Gallery will be open for the reception of Exhibits from 8 A.M. to 6 P.M. on May 28th and (Sunday excepted) up to and including June 2nd, after which dates nothing can be admitted.

5. All Exhibits must be addressed to *the Exhibitor, Art-Manufactures Gallery*, Showyard, Bath. Printed address Labels may be obtained on application to the Secretary.

6. The space applied for must be sufficient to include standing room for the Exhibitor and his assistants without encroaching in any way on the passage.

7. An Exhibitor sub-letting the space allotted to him, or any portion of it, shall forfeit his fees and admission tickets, and neither he, nor the person to whom he has let the space, will be permitted to exhibit.

8. No one will be permitted to offer any article for sale except at the Space allotted to him.

9. The Council will supply counters and fittings (which will remain the property of the Society after the Exhibition), in accordance with a scale of charges to be obtained of the Secretary, providing Exhibitors give notice to the Steward of Works, Showyard, Bath, at least one week previous to the opening of the Exhibition. Exhibitors may bring their own ready-made fittings, but must not construct any in the Building itself without permission of the Steward of Works.

10. No article, with the exception of small Exhibits disposed of to purchasers, must be removed until after the final closing of the Exhibition.

11. Two Non-transferable Admission Tickets, available only for Exhibitors or Assistants at their Stands, will be given to each Exhibitor or firm of Exhibitors. An extra Assistant's Ticket will be given for every 1*l.* 10*s.* paid, beyond the first 1*l.* 16*s.*, up to 10*l.* If a Ticket is transferred or otherwise improperly used, it will be cancelled, and the Exhibitor will be required to pay a fine of 1*l.*

12. Exhibitors' Assistants will be admitted without Tickets up to and including (with the exception of Sunday) the day previous to the opening of the Exhibition, provided they produce an authority from the Exhibitor.

13. The Council will not be answerable for the loss of, or damage to, any article.

14. All persons and articles at the Exhibition will be subject to the Orders, Rules, and Regulations of the Council, and of the officers appointed by them.

FINANCIAL STATEMENTS

FOR

1890,

WITH ITEMS OF 1889 *FOR COMPARISON.*

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The Bath and West

SUMMARY OF THE CASH AC

DR. WITH COMPA

RECEIPTS.		1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	
General Receipts:—				
Dividends		500 10 2		
Subscriptions from Members		1,147 4 0		
Life Compositions		180 0 0		
Journal		8 14 1		
			1,836 8 3	
Show Receipts:—				
Implements		1,403 14 10		
	£ s. d.			
Horses	120 8 3			
Cattle, Sheep, and Pigs	518 18 0			
Catalogues, &c.	166 15 6			
		806 1 9		
Poultry		110 7 10		
Arts	7 0 0			
Art Union	97 19 0			
Art-Manufactures				
		104 19 0		
Home Industries		..		
Horse Shoeing		3 12 6		
Music		9 9 8		
Cheese and Butter		36 14 5		
Working Dairy		91 0 9		
Hops	72 0 0			
Wool	19 15 0			
Fruit	1 10 0			
		93 5 0		
Refreshment Contracts		340 0 0		
Admissions		2623 0 0		
Unapportionable:—				
Cloak Rooms, &c.	32 11 5			
Stand Fittings	276 2 11			
		308 14 4		
Subscription from Bath for 1891 Show		800 0 0		
			6,731 0 1	
Experiments			50 0 0	
Dairy Schools			1,241 18 11	
			9,859 7 3	
BALANCE BROUGHT FORWARD, JAN. 1, 1890			1,540 12 8	
			£11,399 19 11	

uthern Counties Society.

THE YEAR ENDING DEC. 31st, 1890,

EMENT FOR 1889. Cr.

PAYMENTS.	£ s. d.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
General Expenses:—				
Salaries		775 0 0		775 0 0
Rent, Postage, Stationery, &c.		230 15 1		211 16 5
Journal (including grant of £200 to Mrs. Goodwin)		761 1 2		559 13 7
			1,766 16 3	1,546 10 0
Show Expenses:—				
Implements		736 18 5		632 17 7
Horses	535 14 7			788 12 4
Cattle, Sheep, and Pigs	2,265 0 6			2,041 2 11
Fodder, &c.	412 9 3			424 0 7
		3,213 4 4		3,253 15 10
Poultry		290 13 1		298 18 11
Arts	241 12 6			270 10 4
Art Union	194 2 0			253 11 7
Art-Manufactures	..			55 2 2
		435 14 6		579 4 1
Home Industries		..		20 14 7
Horse Shoeing		28 19 4		24 1 7
Music		313 3 5		219 16 1
Horticulture		..		188 11 0
Cheese and Butter		149 10 9		162 16 2
Working Dairy		394 14 10		346 13 0
Hops	69 13 4			
Wool	27 11 1			
Fruit	10 10 4			
Bees	10 0 0			
Building, &c.	40 4 2			
		157 18 11		
Refreshment Contracts		63 11 5		55 9 4
Public Announcements		485 14 4		461 5 5
Unapportionable:—				
Stand Fittings	248 10 8			226 0 0
Erection of Offices, &c.	652 19 4			377 15 4
Carriage of Plant	143 19 0			148 4 3
Police	123 3 3			121 7 3
Miscellaneous	288 15 1			248 7 2
		1,457 7 4		1,121 14 0
			7,727 10 8	7,365 17 7
Experiments			290 6 3	184 1 9
Dairy Schools			1,518 13 9	640 13 11
			11,303 6 11	9,737 3 3
Balance in Bank			96 13 0	1,540 12 8
			£ 11,399 19 11	11,277 15 11

ited and found correct,
ALBERT GOODMAN, Chartered Accountant,
Auditor.

Passed by Council,
January 27th, 1891.
THOS. F. FLOWMAN,
Secretary.

January 14th 1891.

The Bath and West a

Dr. CASH ACCOUNT FOR THE YEAR ENDING DEC. 3

RECEIPTS.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	18 £
DIVIDENDS	..	500 10 2	47
SUBSCRIPTIONS FROM MEMBERS:—			
Arrears	50 0 0		4
Governors	255 18 0		27
Subscribers of £1 and upwards	805 15 0		71
Ditto of 10s.	35 11 0		2
		1147 4 0	111
LIFE COMPOSITIONS	..	180 0 0	9
SALE OF JOURNAL	..	8 14 1	
IMPLEMENTS:—			
Entry Fees	74 10 0		7
Fees for Space:—			
Machinery-in-Motion Shedding	227 0 0		19
Ordinary ,,	354 19 0		34
Miscellaneous Shedding	251 7 6		25
Boarded ,,	212 12 6		17
Seed ,,	36 10 0		3
Uncovered Ground	119 3 4		10
Catalogue Fees	127 12 6		12
		1403 14 10	127
Carried forward	..	£3240 3 1	

uthern Counties Society.

, WITH COMPARATIVE STATEMENT FOR 1889. Cr.

PAYMENTS.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
GENERAL:—			
Salaries:—			
Secretary (including Clerks, Gas, Coal, Lodgings at Show, &c.)	700 0 0		700 0 0
Auditor	20 0 0		20 0 0
Consulting Chemist	30 0 0		30 0 0
Consulting Botanist	25 0 0		25 0 0
		775 0 0	775 0 0
Printing	38 6 0		36 19 1
Stationery and Finance Books	36 0 10		29 0 10
Postage, Telegrams, Cheque and Receipt Stamps	68 11 3		64 15 4
Rent of Offices	26 0 0		26 0 0
Railway Fares	17 2 9		17 7 11
Carriage	7 10 0		7 13 6
Directories and Reference Books	2 12 2		8 15 5
Finance Committee's Expenses	6 0 9		6 3 3
Subscription to Bath Literary Institution	2 2 0		2 2 0
Repairs	22 11 4		9 16 1
Hire of Council Room in London	3 3 0		3 3 0
Transfer of Stock	0 15 0		..
		230 15 1	211 16 5
JOURNAL:—			
Salaries	200 0 0		200 0 0
Honorarium to Mrs. Goodwin	200 0 0		25 0 0
Printing	276 13 6		252 0 8
Plans	3 10 0		3 10 0
Postage, Stationery and Journal Distribution	37 4 8		35 16 5
Payments to Authors	43 13 0		43 6 6
		761 1 2	559 13 7
IMPLEMENTS (YARD):—			
Shedding	635 8 5		539 10 10
Stewards and Assistants	61 8 2		63 1 0
Printing and Stationery	32 0 10		30 5 9
Fees returned	8 1 0		
		736 18 5	632 17 7
Carried forward	..	£2503 14 8	

DR. CASH ACCOUNT—*continued.*

RECEIPTS.	£ s. d.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	189 Ex £
Brought forward . . .		..	3240 3 1	..
HORSES, CATTLE, SHEEP, AND PIGS:—				
Horses:—	£ s. d.			
Entry Fees.	76 10 0			2[illegible]
Fines and Forfeits	1 10 0			3
Grand Stand Admissions . . .	22 8 3			12[illegible]
Local Prizes	20 0 0			..
		120 8 3		33[illegible]
Cattle, Sheep and Pigs:—				
Entry Fees	309 18 0			3[illegible]
Fines	9 0 0			12
Local Prizes	200 0 0			..
		518 18 0		32[illegible]
Hurdles sold	83 0 0			57
Catalogue Sale Privilege . . .	80 0 0			[illegible]
Catalogues Sold after Show . .	0 6 3			[illegible]
Manure and Fodder Sold . . .	3 9 3			9
		166 15 6		147
			806 1 9	81[illegible]
POULTRY:—				
Entry Fees		105 18 0		110 1[illegible]
Local Prizes		3 0 0		..
Commission on Poultry Sales		1 9 10		..
			110 7 10	110 [illegible]
HORSE-SHOEING:—				
Entry fees		..	3 12 6	..
Carried forward . . .		..	£4160 5 2	

CASH ACCOUNT—*continued.* Cr.

PAYMENTS.	£ s. d.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
Brought forward		..	2503 14 8	
HORSES, CATTLE, SHEEP, AND PIGS:—				
	£ s. d.			
Horses—Prizes	285 0 0			
Less deferred	30 0 0			
	255 0 0			382 0 0
Shedding and Grand Stand	204 2 3			335 13 11
Stewards and Assistants	50 3 1			36 7 1
Judges	26 9 3			34 11 4
		535 14 7		788 12 4
	£ s. d.			
Cattle—Prizes	1131 0 0			
Less deferred	28 0 0			
	1103 0 0			1067 0 0
Sheep—Prizes	..			393 0 0
Pigs—Prizes	173 0 0			
Less deferred	5 0 0			
	168 0 0			182 0 0
Shedding	297 5 0			229 8 7
Stewards and Assistants	55 9 4			41 1 1
Judges	148 6 2			187 18 3
Fee returned	..			0 15 0
		2265 0 6		2041 2 11
Hurdles	120 10 6			82 10 0
Fodder	144 5 0			229 1 4
Steward of Fodder and Assistants	20 10 4			20 5 7
Canvas	6 7 6			0 18 9
Veterinary Inspector	16 13 0			19 0 0
Rosettes	9 12 7			7 15 3
Refreshments to Judges	10 10 0			8 13 0
Printing and Stationery	46 3 4			45 16 8
Deferred Prizes	25 0 0			10 0 0
Bolts	8 17 6			..
Miscellaneous	3 19 6			..
		412 9 3		424 0 7
			3213 4 4	3253 15 10
POULTRY:—				
Marquee, Staging and Shed		63 0 2		60 8 4
Stewards and Assistants		20 19 6		24 13 0
Judges		13 7 6		16 17 10
Prizes		174 5 0		168 5 0
Food and Pens		9 0 10		16 5 0
Printing and Stationery		4 17 4		4 4 8
Cartage		2 7 7		7 3 9
Hampers, &c.		2 15 2		1 1 4
			290 13 1	298 18 11
HORSE SHOEING:—				
Prizes		11 2 6		8 17 0
Judge		7 0 0		6 0 0
Printing		0 7 3		0 16 6
Anvils, Forges, Coals and Horses		10 9 7		8 8 1
			28 19 4	24 1 7
Carried forward		..	£6036 11 5	

Dr. CASH ACCOUNT—*continued.*

RECEIPTS.	1890. Rochester. £ s d.	1890. Rochester. £ s. d.	189 £
Brought forward	..	4160 5 2	
ARTS:—			
Commission on Pictures Sales	2 0 0		5
Catalogue Sale Privilege	5 0 0		5
		7 0 0	1
ART UNION:—			
Sale of Tickets	93 0 0		134
Difference in value of Prizes paid by Winners	4 19 0		13
		97 19 0	147
ART MANUFACTURES	..	..	12
HOME INDUSTRIES	..	..	1
MUSIC:—			
Admissions to Enclosure	..	9 9 8	13
CHEESE AND BUTTER:—			
Entry Fees	29 5 0		5
Cheese and Butter Sales	7 9 5		7
Special Prizes	..		1
		36 14 5	6
WORKING DAIRY:—			
Admissions	28 15 9		36
Entry Fees	52 0 0		5
Sale Privilege	10 0 0		..
Miscellaneous	0 5 0		..
		91 0 9	..
Carried forward	..	£4402 9 0	

CASH ACCOUNT—*continued.* Cr.

PAYMENTS.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
Brought forward	..	6036 11 5	..
ARTS:—			
Labour and Fittings	72 13 11		47 14 11
Stewards and Assistants	35 10 0		39 8 6
Selector	20 0 0		20 0 0
Receiving Steward	40 0 0		40 0 0
Do for Labour and Materials	10 0 0		36 12 0
Local Agents and Carriage	52 2 1		76 10 8
Printing and Stationery	5 4 0		10 4 3
Damaged Pictures	6 2 6		5 0 0
		241 12 6	275 10 4
ART UNION:—			
Pictures purchased	175 4 6		222 6 7
Printing and Stationery	7 9 6		8 5 0
Advertising	2 2 0		4 4 0
Commission on Sale of Tickets	9 6 0		13 16 0
		194 2 0	248 11 7
ART-MANUFACTURES	..	..	55 2 2
HOME INDUSTRIES	..	..	20 14 7
MUSIC:—			
Bands and their Fares	240 0 0		166 19 5
Erecting Band Stand and Seats	56 9 5		40 14 8
Stewards and Assistants	16 14 0		12 2 0
		313 3 5	219 16 1
HORTICULTURE	..	..	188 11 0
CHEESE AND BUTTER:—			
Judges	12 12 9		8 10 6
Prizes	99 0 0		114 0 0
Steward	4 0 0		2 0 0
Shedding	28 19 2		33 15 0
Printing, Stationery, &c.	4 18 10		4 10 8
		149 10 9	162 16 2
WORKING DAIRY:—			
Steward and Assistants	46 4 2		41 19 7
Judges and Demonstrators	48 11 3		57 8 6
Building	203 17 8		151 14 6
Printing and Stationery	18 10 10		16 2 2
Utensils and Carriage	18 8 6		22 9 1
Prizes	41 5 2		37 14 10
Coal, Salt, Ice, Cloths, &c.	13 7 3		13 4 4
Dairymaids' Dresses	4 10 0		6 0 0
		394 14 10	346 13 0
Carried forward	..	£7329 14 11	

DR. CASH ACCOUNT—*continued.*

RECEIPTS.	£ s. d.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1890 Ex... £ s.
Brought forward . . .		..	4402 9 0	..
HOPS, WOOL AND FRUIT:—				
Hops—Entry Fees	7 0 0			
Local Prizes	65 0 0			
		72 0 0		
Wool—Entry Fees	5 15 0			
Local Prizes	14 0 0			
		19 15 0		
Fruit—Entry Fees	1 10 0	1 10 0		
			93 5 0	
EXPERIMENTS:—				
Government Grant		..	50 0 0	215
SHOW REFRESHMENT CONTRACTS:—				
Privilege of Sale of Refreshments in Yard . .		..	340 0 0	345 6
UNAPPORTIONABLE:—				
Exhibitors for Stand-fittings		276 2 11		256 0
Cloak Room, Parcels Office, and Photographic Contracts		23 15 9		40 5
Returned on Accounts		8 15 8		3 19
			308 14 4	30.. 14
ADMISSIONS TO SHOWYARD:—				
Season Tickets		118 4 0		93 15
Admissions at 2s. 6d.		380 10 0		1851 10
Ditto at 1s.		1986 18 0		1614 6
Children at 1s.		10 2 0		67 10
Ditto at 6d.		127 6 0		55 6
			2623 0 0	3720 [illegible]
SUBSCRIPTIONS FROM TOWNS:—				
Bath, for 1891 Show		..	800 0 0	807 [illegible]
Carried forward. . .			£8617 8 4	

CASH ACCOUNT—*continued.* Cr.

PAYMENTS.	£ s. d.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
Brought forward		..	7329 14 11	..
HOPS, WOOL, FRUIT AND BEES:—				
Hops—Prizes	65 0 0			
,, Printing	0 16 10			
,, Sampler	1 11 6			
,, Miscellaneous	2 5 0			
		69 13 4		
Wool—Prizes	14 0 0			
,, Printing	0 8 1			
,, Judges	13 3 0			
		27 11 1		
Fruit—Prizes	9 0 0			
,, Printing	1 10 4			
		10 10 4		
Bees—Grant from Council		10 0 0		
Building and Fittings for Hops, Wool, Fruit and Bees		40 4 2		
EXPERIMENTS:—			157 18 11	
Fees to Farmers and Bailiffs, and for Superintendence		110 5 0		70 7 0
Manures		107 4 7		80 7 7
Stewards' Assistant, and Postage		13 5 0		16 5 0
Printing and Stationery		6 11 8		8 11 2
Travelling Expenses		7 10 0		8 0 6
Labels		6 0 0		..
Inspector's Travelling and Hotel Expenses		39 10 0		..
Hire of Room for Meetings		..		10 6
			290 6 3	184 1 9
PUBLIC ANNOUNCEMENTS:—				
Advertising		244 17 0		246 13 8
Bill Posting		150 10 11		112 16 3
Printing		71 4 1		91 13 8
Rent of Placard-Frames Stores		4 0 0		4 0 0
Repairs to Placard Frames and Carriage		15 2 4		6 1 10
			485 14 4	461 5 5
SHOW REFRESHMENT CONTRACTS:—				
Tent and Shedding		58 12 9		49 6 6
Printing, &c.		4 18 8		6 2 10
			63 11 5	55 9 4
UNAPPORTIONABLE:—				
Erection of Offices, Hoarding and other Buildings		652 19 4		377 15 4
Carriage and Storage of Plant		143 19 0		148 4 3
Steward of Works		14 17 6		13 0 0
Exhibitors' Stand Fittings		248 10 8		226 0 0
Extension of Telegraph Wires		6 5 11		4 18 1
Insurance of Plant		4 10 0		4 10 0
Hire of Furniture		8 1 7		6 15 0
Hire of Mess Room		5 5 0		5 5 0
Gatekeepers		57 15 0		57 12 7
Yardmen and Messengers		6 1 10		13 13 3
Stewards of Finance and Treasurer		33 7 5		25 9 9
Finance Office and Treasurer's Clerks		51 9 9		42 4 2
Cloak Room Officials		7 5 6		8 2 6
Police		123 3 3		121 7 3
Badges, &c.		14 14 10		8 11 10
Catalogues for Press and Officials		9 7 6		8 3 0
Purchase of Plant		11 11 7		10 10 3
Printing and Stationery		16 11 6		18 19 10
Commission on Sale of Season Tickets		3 17 7		2 1 6
Sundries		34 9 7		18 10 5
Caretaker		3 3 0		..
			1457 7 4	1121 14 0
Carried forward			£9781 13 2	

DR. CASH ACCOUNT—*continued.*

RECEIPTS.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	189[illegible] £ [illegible]
Brought forward	..	8,617 8 4	
BUTTER SCHOOLS:—			
Students' Fees	59 9 6		[illegible]
Admissions	66 9 2		[illegible]
Government Grant	250 0 0		3[illegible]
Sales, &c.	0 12 6		[illegible]
		376 11 2	55[illegible]
CHEESE SCHOOL:—			
Student's Fees	273 13 0		
Cheese sold	471 18 9		
Allowance on Cheese-making Apparatus . .	19 16 0		
Government Grant	100 0 0		
		865 7 9	
		9,859 7 3	10,2[illegible]
BALANCE BROUGHT FORWARD, JAN. 1, 1890 .	...	1,540 12 8	1,02[illegible]
	£	11,399 19 11	11,27[illegible]

CASH ACCOUNT—*continued.*

Cr.

PAYMENTS.	1890. Rochester. £ s. d.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
Brought forward	..	9,784 13 2	
BUTTER SCHOOLS:—			
Teachers' Salaries, Lodgings, and Fares	154 1 11		166 10 9
Prizes	17 2 6		17 17 0
Steward and Judges' Expenses for Travelling, Hotel, and Horse Hire	125 9 1		157 18 3
Purchase of Plant	16 4 1		51 12 1
Carriage of Plant	40 11 2		58 19 7
Attendants and Ticket Takers	63 0 5		75 17 8
Printing and Advertising	3 8 9		21 5 7
Secretary's Railway Fares	11 8 8		16 17 2
Postage and Telegrams	8 9 8		10 13 2
Buildings and Fittings	13 18 10		32 18 6
Coal, Salt, Ice, &c.	27 7 1		30 4 2
Secretary's Office Expenses (2 years)	25 0 0		..
		506 2 2	640 13 11
CHEESE SCHOOL :—			
Teacher	70 0 0		
Bailiff	33 15 0		
Milk	629 8 2		
Students' Board	106 6 6		
Plant	47 4 7		
Rail Fare and Cabs	11 11 8		
Hotel	2 13 5		
Postage and Telegrams	8 16 11		
Coal	6 17 7		
Printing and Stationery	10 3 6		
Steward's Expenses	30 1 9		
Fittings	1 10 6		
Bandages	7 12 0		
Secretary's Office Expenses	25 0 0		
Advertisements	4 8 0		
Miscellaneous	7 2 0		
Supervisor's Expenses	10 0 0		
		1,012 11 7	
		11,303 6 11	9,737 3 3
Balance in Bank		96 13 0	1,540 12 8
		£11,399 19 11	11,277 15 11

I hereby certify that I have examined the foregoing accounts for the year 1890, compared the ments with the vouchers, and found them all correct and in order.

ALBERT GOODMAN, Chartered Accountant,
Auditor.

h, 1891.

Passed by Council,
Jan. 27th, 1891.

THOS. F. PLOWMAN,
Secretary.

The Bath and West a

ASSETS AND LIABILITIES TO DECEMBER

ASSETS.				1890. Rochester. £ s. d.	18
INVESTMENTS				16,000 0 0	16,
	Par Value. £ s. d.	Actual Cost. £ s. d.			
Consols	1,958 4 0	2,209 19 6			
India Stock	8,000 0 0	7,790 0 6			
Canada Stock	1,790 13 4	2,000 0 0			
Queensland Stock	1,805 16 11	2,000 0 0			
N. S. Wales Stock	1,752 8 10	2,000 0 0			
	15,307 3 1	16,000 0 0			
PLANT (WORKS)		632 6 11			675
PLANT (SCHOOLS)		100 2 9			47
				732 9 8	72
SUBSCRIPTION ARREARS				151 15 0	127
UNPAID ACCOUNTS				5 0 0	2
GOODS IN HAND (Cheese)				180 0 0	..
				17,069 4 8	16,[illegible]
Balance in Bank on Dec. 31				96 13 0	1,5[illegible]
				17,165 17 8	18,[illegible]
Balance brought down				£ 15,816 13 3	17,[illegible]

Southern Counties Society

90, WITH COMPARISON FOR 1889.

LIABILITIES.	1890. Rochester. £ s. d.	1889. Exeter. £ s. d.
DEFERRED PRIZES	63 0 0	40 0 0
BATH MEETING	800 0 0	800 0 0
'JOURNAL,' cost of, estimated at	450 0 0	450 0 0
UNPAID ACCOUNTS	36 4 5	30 0 0
	1,349 4 5	1,320 0 0
Balance carried down	15,816 13 3	17,100 3 7
	£ 17,165 17 8	18,420 3 7

Audited and found correct,
ALBERT GOODMAN, Chartered Accountant,
Auditor.
January 14th, 1891.

Passed by Council,
January 27th, 1891.
THOS. F. PLOWMAN,
Secretary.

Annual Exhibitions.

Date.	Place visited.	Local Subscription.	President.
		£	
1852	Taunton	210	Lord Portman.
1853	Plymouth . . .	450	Sir T. D. Acland, Bart.
1854	Bath	450	William Miles, M.P.
1855	Tiverton	450	Earl Fortescue.
1856	Yeovil	450	C. A. Moody, M.P.
1857	Newton Abbot . .	700	Lord Courtenay.
1858	Cardiff	800	Lord Courtenay.
1859	Barnstaple . . .	800	John Sillifant.
1860	Dorchester . . .	900	Lord Rivers.
1861	Truro.	900	J. W. Buller, M.P.
1862	Wells.	900	Sir T. D. Acland, Bart.
1863	Exeter	900	Marquis of Bath.
1864	Bristol	1000	Earl Fortescue.
1865	Hereford	900	Lord Taunton.
1866	Salisbury. . . .	900	Earl of Portsmouth.
1867	Salisbury . . .	..	J. Tremayne.
1868	Falmouth . . .	900	Sir J. T. B. Duckworth, Bart.
1869	Southampton . .	900	Earl of Carnarvon.
1870	Taunton	900	Sir S. H. Northcote, Bart., C.B., M.P.
1871	Guildford . . .	900	Earl of Cork, K.G.
1872	Dorchester . . .	800	Duke of Marlborough, K.G.
1873	Plymouth . . .	800	Earl of Mount-Edgcumbe.

Date.	Place visited.	Local Subscription.	President.
		£	
1874	Bristol	800	Sir Massey Lopes, Bart., M.P.
1875	Croydon	800	R. Benyon, M.P.
1876	Hereford	800	Earl of Ducie.
1877	Bath	800	Marquis of Lansdowne.
1878	Oxford	800	Earl of Jersey.
1879	Exeter	800	Earl of Morley.
1880	Worcester . . .	800	Earl of Coventry.
1881	Tunbridge Wells .	800	Marquess of Abergavenny.
1882	Cardiff	800	Lord Tredegar.
1883	Bridgwater . . .	800	Lord Brooke, M.P.
1884	Maidstone . . .	800	Viscount Holmesdale.
1885	Brighton	800	Viscount Hampden.
1886	Bristol	800	Lord Carlingford.
1887	Dorchester . . .	800	Earl of Ilchester.
1888	Newport (Mon.) . .	800	Lord Tredegar.
1889	Exeter	800	Lord Clinton.
1890	Rochester . . .	800	Earl of Darnley.
1891	Bath	800	Earl Temple.

PRIZE DONATIONS FROM MEMBERS AND OTHERS.

Date.	Name.	Classes in which Prize was given.	Amount.
			£ s.
1854	Parker, H. . . .	Hampshire Down Sheep . .	10 10
1854	Taylor, Chas. . .	" " " . .	0 10
1854	Woolly, B. C. . .	" " " . .	1 0
1854	Woolly, W. . . .	" " " . .	0 10
1857	Hood, Sir Alexander Bart.	Cart Colt	10 0
1858	Acland, T. D. (now Sir T. D., Bart.) .	Flannel	5 0
1858	Gray, Jonathan (deceased) . . .	"	5 0
1858	Trevelyan, Sir W. C. (deceased) . . .	Essay on Cider	25 0
1858	Williams, C. C. . .	Flannel and Implements . .	23 0
1859	Acland, Sir T. D., Bart. (deceased) .	Stock	50 0
1859	Buller, J. W. (deceased). . . .	Ponies	10 10
1859	Knight, F. W. . .	Exmoor Sheep	10 10
1859 to 1878	Miles, William (deceased). . . .	Horse Shoeing	126 0
1859	Sillifant, J. (decd.) .	Devon Bull	10 10
1864	Bristol Society of Merch. Venturers.	Stallion	50 0
1869	Morrison, Alfred. .	Hampshire Down Sheep . . .	8 0
1869	Portsmouth, Earl of .	" " " . . .	10 0
1871	Morrison, Alfred . .	" " " . . .	6 0
1871	Portsmouth, Earl of .	" " " . . .	10 0
1872	Williams, Herbert (deceased) . . .	Special Prize	10 0
1876	Moore-Stevens, J. C.	Honiton Lace	25 0
1878 to 1884	Morrell, G. H. . .	Langshan Poultry	42 0
1879	Marryatt, Horace .	Honiton Lace	5 0
1879	Moore-Stevens, J. C.	" "	5 0
1882	Best, J. C, R.N. .	Black Welsh Cattle	17 0
1884	Brassey, H. A., M.P.	Dairy Cattle	50 0
1884	Le May, W. H. & H.	Hops (Plate)	25 0
1885	'Sussex Daily News'	Harness Horses	15 15
1885	Bristol, Marquis of .	Stock (Silver Cup).	
1885	Trustees Brighton Race Stand . .	" "	67 0

Date.	Name.	Classes in which Prizes were given.	Amount.	
			£	s.
1889	Tegetmeier, W. B.	Poultry (Silver Cup)	3	0
1889	Acland, C. T. D., M.P.	Butter	5	0
1889	Stanbury, J. H.	"	5	0
1889–90	'Field,' Proprietors of	Poultry (Silver Cups)	6	0
1890	Le May, W. H. & H.	Hops (Plate)	26	5
1891	Lewis, W. & Son	Stock and Dairy Produce	100	0

PRIZE DONATIONS FROM LOCAL COMMITTEES.

Date.	Place represented by Committee.	Classes in which Prizes were given.	Amount.	
			£	s.
1859	Barnstaple	Stock	85	0
1864	Bristol	"	106	0
1865	Hereford	"	358	0
1866–7	Salisbury	"	57	10
1868	Southampton	"	132	0
1871	Guildford	"	110	0
1874	Bristol	"	403	0
1875	Croydon	"	245	0
1876	Hereford	"	381	0
1877	Bath	Stock and Dairy Produce	215	0
1881	Tunbridge Wells	Stock	245	0
1882	Cardiff	"	200	0
1883	Bridgwater	Stock and Dairy Produce	78	0
1884	Maidstone	Stock and Hops	310	5
1885	Brighton	Stock	227	0
1886	Bristol	"	525	0
1888	Newport	"	100	0
1890	Rochester and Chatham	Stock and Hops	294	0
1891	Bath	Dairy Produce	50	0

PRIZE DONATIONS FROM SOCIETIES.

Date.	Name of Society.	Classes in which Prizes were given.	Amount. £	s.
1873	Devon Agricultural Society . . .	Stock	400	0
1878	Oxfordshire Agricultural Society . .	„	170	10
1880	Worcestershire Agricultural Society .	„	254	0
1881	Sussex Herd-Book Society . . .	„	34	0
1882	Glamorganshire Agricultural Society .	„	198	0
1884–5	Sussex Herd-Book Society . . .	„	66	0
1885	Langshan Society .	Poultry	3	3
1887	Dorchester Agricultural Society . .	Stock and Dairy Produce . .	112	12
1887–90	English Guernsey Cattle Society . .	Guernsey Cattle (Medals).		
1887–91	English Jersey Cattle Society. . . .	Jersey Cattle (Medals).		
1890–91	Shropshire Sheep Breeders' Association	Shropshire Sheep	15	0
1891	Somerset Agricultural Association . .	Stock and Dairy Produce . .	103	0
1891	Hunters' Improvement Society . .	Brood Mare (Medal).		

SPECIAL DONATIONS.

Date.	Name.	———	Amount. £	s.	d.
1853	Gray, Jonathan . .	Poultry Show Proceeds at Plymouth	282	16	0
1854	„ „ . .	Poultry Show Proceeds at Bath	458	0	4

Bath and West of England and Southern Counties Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

List of Members.

CORRECTED TO JANUARY 27TH, 1891, INCLUSIVE.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT

FOR 1890-91.

THE RIGHT HON. THE EARL TEMPLE.

TRUSTEES.

RIGHT HON. SIR T. D. ACLAND, BART.
SIR J. F. LENNARD, BART.
SIR R. H. PAGET, BART., M.P.

Names thus (*) distinguished are Governors.
Names thus (†) distinguished are Life Members.

**** Members are particularly requested to make the Secretary acquainted with any errors in the names or residences.*

Name.	Residence.	Subscriptions. £.	s.	d.
†WALES, HIS ROYAL HIGHNESS THE PRINCE OF	.. ..	.	.	
*Abergavenny, Marquess of, K.G.	Eridge Castle, Tunbridge Wells .	2	0	0
†Ackers, B. St. John . . .	Huntley Manor, Huntley, near Gloucester	.	.	
*Acland, Right Hon. Sir T. Dyke, Bart.	Killerton, Exeter	5	0	0
Acland, Charles T. D., M.P. .	Killerton, Exeter	1	0	0
†Acland, A. H. Dyke, M.P. .	Clynnog, Carnarvon	.	.	
Adams, A.	Horner Farm, West Luccombe, Minehead	0	10	0
Adams, George	Royal Prize Farm, Pidnel, Faringdon, Berks	1	0	0
Adams, S. W., jun. . . .	7, Boringdon Villas, Plympton St. Mary	1	1	0
Affleck, W.	Prospect House, Swindon . . .	1	0	0
†Agate, Alfred	Broomhall, Horsham	.	.	
Aiken, J. C.	The Glen, Stoke Bishop, Gloucestershire	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Albion Iron Works Co.	Rugeley, Staffordshire	1	0	0
†Allen, Col. E.	Manor House, Bathampton			
Alexander, D. T.	Cardiff	1	0	0
†Allen, James D.	Belle Vue House, Evercreech, near Bath			
Allen, Joseph	Chesterblade, Shepton Mallett	1	0	0
Allender, G. M.	Stammerham, Horsham, Sussex.	1	0	0
Ames, E. L.	Clevelands, Lyme Regis, Dorset	1	0	0
*†Amherst, Earl	Montreal, Sevenoaks			
Andrews, G., jun.	Plympton	1	0	0
Anglo-Bavarian Brewery Co.	Shepton Mallet	1	0	0
Anglo-Swiss Condensed Milk Co.	Chippenham	1	0	0
Archer, C.	Trelaske, near Launceston	1	0	0
†Arkwright, J. H.	Hampton Court, Leominster			
Arnold, W., Lieut.-Col.	Nethercott, Winkleigh, N. Devon	0	10	6
*Ashburton, Lord	The Grange, Alresford, Hants	5	0	0
Ashby, William	East Dean, Eastbourne	1	0	0
Ashcroft, W.	Hayes, Beckenham	1	0	0
Ashe, J. W. L.	Ivy Bank, Camden Hill, Chislehurst	1	0	0
Ashford, J.	Loxbeare, Tiverton	1	0	0
Ashton, R.	Heywood Lodge, Maidenhead.	1	0	0
Asprey, F.	Somerset Villa, Bath	1	0	0
†Aveling, Thomas L.	Rochester			
Avon Manure Co.	St. Philip's Marsh, Bristol	1	0	0
Aylesbury Dairy Co.	31, St. Petersburgh Place, Bayswater, London, W.	1	0	0
Ayre Bros.	The Avenue, High Street, Hull	1	0	0
Baber, S.	Elborough Farm, Locking, West-on-super-Mare	1	0	0
Badcock, H. Jeffries.	Taunton	1	0	0
Bagnall, G.	Westwell, Burford, Oxon	1	0	0
†Baggs, M.	York Villa, Kensington, Bath			
Bailey, Henry J.	Rowden, Bromyard, Hereford	1	1	0
Bailey, S.	Hornshay Farm, Wellington	1	1	0
†Baillie, Evan	Filleigh, Chudleigh			
Bailwood, F. H. M.	Horsington, Wincanton	1	1	0
Baker, F.	Manor Farm, Frindsbury, Rochester	1	0	0
Baker, G. E. Lloyd	Hardwicke Court, nr. Gloucester.	1	0	0
†Baker, L. J.	Chertsey Park, Surrey			
†Baker, Robert N. G.	Heavitree, Exeter			
Baker, Thomas	Compton, Newbury, Berks	1	0	0
Baker, T. H.	Mere Down, Mere	0	10	0
Baker, William	Temple Street, Bristol	1	0	0
Baker, W. S.	Hill House, Stone, Dartford	1	0	0
Bale, Samuel	Westacott Nursery, Barnstaple	1	0	0
Bamber, H. K., F.C.S.	Altons, Rusper, Sussex	1	0	0
Bamlett, A. C.	Thirsk, Yorkshire	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
ınbury, Alfred	Launcells, Stratton	0	10	0
ınkes, A.	Wolveton, Dorchester	1	0	0
ırchard, F.	Horsted Place, near Uckfield . .	1	0	0
ırham, G. T.	College Farm, Finchley . . .	1	0	0
ırnard and Lake	Braintree, Essex	1	0	0
Barnett, Henry	Glympton Park, Woodstock . .	2	0	0
ırrett, Major William . .	Moredon, North Curry, Taunton	1	0	0
ırton, C. C.	Upton House, Rownhams, Southampton	1	0	0
ırton, John	Hackwood Farm, Basingstoke. .	1	1	0
ırttelot, Major Walter . .	Coates, Pulborough, Sussex . .	1	1	0
Bassett, C. H.	Pilton House, Barnstaple . . .	.	.	
Bastard, Baldwin J. P. . .	Kitley, Yealmpton, Ivybridge .	2	0	0
ıth and Wells, The Right Rev. The Bishop of. . .	The Palace, Wells	1	1	0
Bath, Marquess of . . .	Longleat, Warminster	.	.	
ıth Gas Co.	Bath	1	0	0
ıtt, A.	Westown, Bristol	1	0	0
ıtt, T., jun.	Clapton, Bath	1	0	0
ıttams, G. B.	Kilworthy, Tavistock	1	0	0
ıtten, E. C., F.R.S.E. . .	Thornfalcon, Taunton	1	0	0
ıtten-Pooll, R. H.. . . .	Road Manor, Bath	1	0	0
Battishill, W. J.	St. Loyes, Exeter	.	.	
ıunton, Edward	Broadway, Dorchester	1	0	0
ayne, W.	Brock Hill, Broadclyst, Exeter .	1	0	0
Beale, William	Larking's Farm, Chiddingstone, Edenbridge, Kent	.	.	
auchamp, E. B.	Trevince, Scorrier, Truro . . .	1	0	0
eauchamp, W.	Stratton House, Stratton-on-the-Fosse, Bath	1	0	0
eauchamp, W. B.	Norton Hall, Midsomer Norton, Bath	1	0	0
eaufoy, M. H., M.P. . . .	Coombe Priory, Shaftesbury . .	1	0	0
eckingham, W. J. . . .	Upper Ashe Farm, Micheldever, Overton, Hants	1	0	0
lfield, J. F.	Primley Hill, Paignton, Torquay	1	0	0
ıl, J. W.	Gillingham, Dorset	1	0	0
Benett-Stanford, V. F. . .	Pyt House, Salisbury	.	.	
enjafield, Nathaniel . . .	Short's Green Farm, Motcombe, Shaftesbury	1	0	0
ennett Brothers	*Journal* Office, Salisbury . . .	1	1	0
ensted, W.	Bourley Farm, Sandling, Maidstone	1	0	0
ensted, W. H.	Longfield, Maidstone	1	0	0
entall, Edward Hammond, & Co.	Heybridge, Maldon, Essex . .	1	0	0
Benyon, R.	Englefield House, Reading. . .	5	0	0
ere, R.	Milverton, Somerset	1	0	0
erridge, R. J.	Somerton, Oxon	1	0	0
erriman, J.	Moredon Farm, Swindon . . .	1	0	0
Bertie, Lord	Uffington House, Stamford . .	.	.	
Best, Capt. John C. (R.N.).	Plas-yn-Vivod, Llangollen . .	.	.	

Name.	Residence.	Subscription £.	s.	d.
†Best, Col. George	Charlton House, Ludwell, Salisbury		. .	
Best, Major M. G.	Park House, Boxley, Maidstone .	1	0	
Best, Captain T. G.	Abbotts Ann, Andover	1	0	
Bewsey, J. L.	Cheriton House, Temple Combe, Bath	1	0	
Bice, J.	Newlyn East, Grampound Road, Cornwall	1	0	
Bickle, R.	Bradstone Hall, Tavistock . . .	1	0	
Bigg, Thomas	Leicester House, Great Dover Street, London, E.C.	0	10	
Birmingham, C.	Holnicote, near Minehead . . .	0	10	
Biscoe, W. E.	Holton Park, Wheatley, Oxford .	1	0	
Blackstone and Co. (Limited)	Rutland Iron Works, Stamford, Lincoln	1	1	
Blake, Abel	Loxbeare, Tiverton	0	10	
Blake, William	Bridge House, Ilminster, near South Petherton	1	0	
Blaker, George	Piccomb, Hurstpierpoint . . .	1	0	
Blommart, John	Willett House, Taunton . . .	1	0	
Blunt, E. T.	Blaby Hill, near Leicester . . .	1	0	
Blyth, J.	Pantheon, Oxford Street, London	1	0	
Boby, Robert	Bury St. Edmunds, Suffolk . .	1	0	
Bolitho, E.	Treridden, Penzance	1	0	
Bolitho, T. B., M.P. . . .	Treridden, Penzance	1	0	
Bond, A.	Burn Bickleigh, Tiverton . . .	1	0	
Bond, G. H., M.P.	Creech Grange, Wareham . . .	1	0	
†Bond, N.	Creech Grange, Wareham, Dorset		. .	
Boteler, Capt. W. J. Casberd	The Elms, Taplow	1	0	
Boucher, Rev. A. F. . . .	Kempsey Manor, Worcester . .	1	0	
†Boughton-Knight, A. R. . .	Downton Castle, Ludlow . . .		. .	
Bound, William	Hurstborne, Tarrant, Andover .	1	1	
Bourne, C. H.	Wellington Road, Dudley . . .	1	1	
Bouverie, Hon. D. P. . . .	Coleshill House, Highworth . .	1	0	
Bouverie, P. P., jun. . . .	Brymore, Bridgwater	1	0	
Bouverie, H. P.	Brymore, Bridgwater	1	0	
‡Bouverie, W. P.	Little Cheverill, Devizes . . .		. .	
†Bowen, Jones J.	Ensdon House, Montford Bridge.		. .	
†Bowerman, Alfred . . .	Capston, Williton		. .	
Boys, T. H.	Bridgwater	1	0	
Braby, James	Maybank, Rudgwick, Horsham .	1	0	
Bradburne, T.	Astwood Hill, Redditch . . .	1	0	
Bradford, J. E. G.	Swindon	1	0	
Bradford, Thos., and Co. . .	63, Fleet Street, London . . .	1	0	
†Braikenridge, John Herman.	The Rookery, Chew Magna, Bristol		. .	
Braikenridge, W. J. . . .	Newton House, Clevedon, Somerset	1	1	
†Brassey, A.	Heythrop, Chipping Norton, Oxon		. .	
*Brassey, H. A.	Preston Hall, Aylesford . . .	2	2	
*Brassey, Lord	Normanhurst, Battle, Sussex .	5	0	
Brendon, G.	Bude Haven, Cornwall	1	0	
Bridges, Rev. Canon A. H. .	Beddington House, Croydon . .	1	1	
Bridges, John Henry . . .	Ewell, Surrey	1	1	

Name.	Residence.	Subscriptions. £.	s.	d.
Bridgman, —	Ham Farm, Nailsea, Bristol	1	0	0
Bristol Wagon Works Company (Limited)	Lawrence Hill, Bristol	1	1	0
Broad, Thomas Dyke	Bath	1	0	0
Broadmead, T. Palfrey	Enmore Park, Bridgwater	1	0	0
Brock, J. C.	High Ridge Farm, Dundry, Bristol	1	0	0
Brock, S.	Newhall, Broad Clyst, Exeter	1	0	0
Brockman, F. D.	Beach Borough, Hythe, Kent	1	0	0
Broderip, E.	Cossington, Somerset	1	0	0
Brodie, Sir B. V. S., Bart.	Brookham Warren, Betchworth	1	0	0
*Brooke, Lord, M P.	Easton Lodge, Dunmow	2	2	0
Brown and Co.	Salisbury	1	0	0
Brown, James	Shepton Mallet	1	0	0
Brown, William Jeffery	Middlehill House, Box, Wilts	1	0	0
Browne and Co.	Bridgwater	1	0	0
Browne, Solomon	Barton, Landrake, Devonport	0	10	0
Browne, W. J.	Buckland Filleigh, Highampton	1	0	0
*Bruce, W. A.	96, Sydney Place, Bath	2	0	0
Brune, C. G. Prideaux	Prideaux Castle, Padstow	1	0	0
Brutton, J.	7, Princes Street, Yeovil	1	0	0
†Bryce, J. P.	Bystock, near Exmouth	.	.	
†Brymer, William E.	Ilsington House, Dorchester	.	.	
Buck, A.	Worcester	1	0	0
Buckingham, W.	Southernhay, Exeter	1	0	0
Budgett, W. E.	Stoke Bishop, near Bristol	1	1	0
Bull, Alfred	25, High Street, Guildford	1	1	0
†Bullock, George Troyte	North Coker House, Yeovil	.	.	
Bulteel, John	Pamflete, Ivybridge	1	0	0
Bunyard, G.	Old Nurseries, Maidstone	1	1	0
Burbidge, Charles	Chitterne St. Mary, Codford, Wilts	1	0	0
Burbidge, Edwin	South Wraxall, Bradford-on-Avon	1	0	0
Burge, William	Stoke Farm, Charles, South Molton	0	10	0
Burnard, R.	Sutton Road, Plymouth	1	0	0
Burnett, H.	Sperrings Farm, Clapton, Portishead, Bristol	1	0	0
Burnett, J.	Island House, Highbridge	1	0	0
†Burrell, Sir C. R., Bart.	Knepp Castle, Sussex	.	.	
Burrow, G.	Manor Farm, South Marston, Swindon	1	1	0
Bush, B.	Manor Farm, Laverton, Bath	1	0	0
†Bush, J. D.	Bath	.	.	
Bush, R. H.	The Castle, Chew Magna	1	0	0
Buss, E.	Elphicks, Horsmonden, Kent	1	0	0
Bute, Marquess of	Cardiff Castle	.	.	
*Butler, Samuel	Combe Hay Park, Bath	2	2	0
Butterworth, R. W.	Rockwell, Henbury, Bristol	1	0	0
Calmady, V. P.	Tetcott, near Holsworthy, Devon	1	0	0
*Calthorpe, Lord	Elvetham Park, Winchfield	2	0	0
Calvert, Col. A. M.	Ockley Court, Dorking	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Campbell, C. Lee	Glewstone Court, Ross	1	0	0
Campion, W. H.	Danney, Hassocks, Sussex. . .	1	0	0
Candy, T. C.	Woolcombe, Cattestock, Dorset .	1	0	0
Cannon, H.	Milton Clevedon, Evercreech .	1	0	0
Caple, J.	Beach Farm, Bitton, Gloucestershire	1	0	0
Capon, G. C.	Mortimers, Cliffe, Rochester . .	1	0	0
*Carew-Gibson, G. C. . . .	Kingsfold, Billingshurst, Sussex.	2	0	0
*Carlingford, Lord	The Priory, Chewton Mendip, near Bath	2	2	0
†Carnarvon, Earl of . . .	High Clere Castle, Newbury . .	.	.	.
Carson and Sons.	La Belle Sauvage Yard, Ludgate Hill, London	1	1	0
Carson and Toone	Warminster	1	0	.
†Carter, E.	Puckpool House, Ryde, Isle of Wight	.	.	.
Carter, J., and Co.	238, High Holborn, London . .	1	1	0
†Carter-Wood, Joseph. . .	Artillery Place, Victoria Street, Westminster	.	.	.
†Cartwright, F. F.	7, Percival Road, Clifton	.	.	.
Carver, John	West House, Chilton Polden, Bridgwater	1	0	0
Cary, Edmund	Pylle, Shepton Mallet	0	10	0
†Cary, W. H.	Steeple Ashton, Trowbridge . .	.	.	.
Castle, R.	18, Merton Street, Oxford . . .	1	0	0
Cater, R. B.	Bath	1	1	0
Cathedral Dairy Co. . . .	Exeter	1	0	0
†Catt, C. W.	52, Middle Street, Brighton (Hon. Local Sec., 1885)	.	.	.
*Cawdor, Earl of	Stackpole Court, Pembroke . .	2	0	0
Cay, A.	Woodside, Kenilworth	1	0	0
Cecil, Lord A.	Orchardmains, Tunbridge . . .	1	0	0
Cecil, Lord L.	Orchardmains, Tunbridge . . .	1	0	0
Chamberlain, Pole, and Co. .	Bristol	1	0	0
Chamier, E. F.	Stratton, Cornwall	1	0	0
Champion, S. H.	Newbery Farm, Kilmersdon, Bath	1	0	0
Channings, R.	High Bray, South Molton . . .	0	10	0
Channon, J.	Wishford, Broad Clyst, Exeter .	1	0	0
†Chapman, C.	Carlecotes Hall, Dunford Bridge, near Sheffield	.	.	.
Chapman, G.	Radley, near Hungerford, Berks .	1	1	0
Chapman, W. W.	Estate Office, Wadhurst Park, Hawkhurst, Sussex	1	0	0
Charles, W.	Breedy, Bridport	1	0	0
Chichester, C.	Kenn, near Exeter	1	0	0
Chick, John	Compton Valence, Dorchester. .	1	0	0
Chorley, W. L.	Quarme, Dunster, Somerset . .	1	1	0
Christie, A. L.	Tapeley Park, Bideford . . .	1	0	0
Churchouse, A.	Westholme, Shepton Mallet . .	1	0	0
Clark, Isaac	The Manor, Heddington, Calne .	1	0	0
Clarke, Isaac	West Lynch, Selworthy . . .	1	0	0
Clark, James	Street, Glastonbury	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Clark, J. J.	Goldstone Farm, West Brighton (Hon. Local Sec., 1885)		. .	
Clark, W. S.	Street, Glastonbury	1	0	0
Clarke, Joshua	Minehead	1	0	0
Clarke, T. E.	Parks, Minehead		. .	
Clarke, W.	East Lynch, near Minehead, Somerset	1	0	0
Clayden, H.	Northoe, Park View, Hoddesdon	1	1	0
Clayton, Shuttleworth, and Co.	Lincoln	2	2	0
Cleall, S.	Berwick, Bridport	1	0	0
Cleave, B. C.	Sanctuary, Crediton, Devon	1	1	0
Cleave, W. C.	Sanctuary, Crediton, Devon	1	1	0
Clerk, Edmund H.	Burford, Shepton Mallet	1	0	0
Cleveland, Duke of	Bathwick, Bath	2	0	0
Clifford, Lord	Ugbrook, Chudleigh		. .	
Clifton, J. H.	Upland House, Keynsham, Bristol	1	1	0
Clinton, Lord	Heanton Satchville, Beaford, North Devon	2	2	0
Clothier, Frederick	Bristol Road, Weston-super-Mare	0	10	0
Clout, R.	Brome House, West Malling, Kent	1	0	0
Clutton, Henry	Hartswood, Reigate	1	0	0
Clutton, John	3, Sussex Sq., Hyde Park, London	1	0	0
Clutton, Robert Geo.	9, Whitehall Place, London	0	10	0
Clutton, R. W.	Doner's Lodge, Reigate	1	0	0
Coates, S. B.	Stanton Drew Court, Pensford	1	0	0
Cobb, H. M.	Higham, Kent	1	0	0
Cobb, R. L.	Higham, Kent	1	0	0
Cock, George	Dowerlands, South Molton	0	10	0
Cockey and Sons	Frome Selwood	0	10	0
Coleman and Morton	London Rd. Iron Works, Chelmsford	1	0	0
Coleman, W. T.	Langley Fitzurse, Chippenham	1	0	0
Coles, J. C.	Chippenham	1	0	0
Coles, R.	Middleton, Norton Bavant, Warminster	1	0	0
Coles, C. and T.	Manor House, Winterbourne Stoke, Salisbury	1	0	0
Colfox, T. A.	Coneygar, Bridport	1	0	0
Colfox, W.	Westmead, Bridport	1	0	0
Collins, C. H.	Chew Magna, Somerset	1	0	0
Collins, C. R.	Strathculm, Hele, Cullompton	1	1	0
Collins, D.	Newton Ferrars, Carrington, Cornwall	1	0	0
Collins-Splatt, Col. H.	Brixton House, Plympton	1	1	0
Colman, J. J., M.P.	Carrow House, Norwich	1	1	0
Colmer, Jas.	Redland Knoll, Bristol	1	1	0
Colthurst, Symons, and Co.	Bridgwater	1	0	0
Combe, R. H.	Pierrepont, Farnham	2	0	0
Combe, R. T.	Earnshill, Curry Rivell, Taunton	2	0	0
Coney, Herbert F.	The Poplars, Pucklechurch, Bristol	1	0	0
Cook-Hurle, J., jun.	Southfield House, Brislington, Bristol		. .	

Name.	Residence.	Subscriptions. £.	s.	d.
Cookson, T.	Sturford Mead, Warminster	1	0	0
Cooling, G., and Son	Northgate Street, Bath	1	0	0
Coombs, G.	Radstock, near Bath	1	0	0
Coombs, Joseph	Radstock, Bath	1	0	0
Cooper, G.	Branscombe, near Sidmouth	0	10	0
Cooper, G. H.	Inglesham Dairy, Lechlade	1	0	0
Cooper, P. N.	Westbury-on-Trym, Bristol	1	0	0
†Cooper, P. W. D.	99, Pembroke Road, Clifton		..	
Corbett, J. R.	More Place, Betchworth, Surrey.	1	0	0
Corbett, J. S.	Cogan Pill, near Cardiff	1	1	0
Corbett, Thomas	Perseverance Iron-Works, Shrewsbury	1	0	0
*Cork and Orrery, The Earl of	Marston, near Frome	2	2	0
†Corner, H. W.	Manor House, Inglescombe, Bath		..	
Cornish, H. J.	Pyt House, Thornford, Sherborne	1	0	0
Cornish, W. T.	Abbey Churchyard, Bath	1	0	0
†Cornwallis, F. S. W.	Linton Park, Maidstone		..	
Corp, W. F.	Woodbine Farm, West Pennard, Glastonbury	1	0	0
Cory, R.	Langdon Court, Plymouth	1	0	0
*Coryton, Col. A.	Pentillie Castle, Plymouth	2	0	0
Cotterell, W.	Derry Ormond Park, Cardiganshire.	1	0	0
Cotton, R. W.	Bultonsbury, Glastonbury	1	0	0
Courtenay, Hugh	Dunster, Taunton	1	0	0
†Coussmaker, Lieut.-Col. G.	Westwood, Guildford, Surrey		..	
*Coventry, The Earl of	Croome Court, Severn Stoke, Worcestershire	2	0	0
Cox, James	High Littleton, Bath	1	0	0
Crane, James	Torpuddle, Dorchester	1	0	0
Crawshay, W. T.	Cyfarthfa Castle, Merthyr Tydvil	1	0	0
Crees, C.	Seymour Court Farm, Beckington	1	0	0
Crick, Thomas	Great Ash, Winsford, Dulverton	0	10	0
Crookes, J. W.	Little Testwood, Totton, Hants	1	0	0
Crutchley, P. E.	Limming Hall, Ascot Park	1	0	0
†Cubitt, Rt. Hon. Geo., M.P.	Denbies, Dorking		..	
*Cubitt, William	Fallapit Mounts, R.S.O., S. Devon	2	0	0
Culverwell, Bros.	Durleigh Farm, Bridgwater	1	0	0
Cuming, A. P.	Moreton Hampstead, Devon	1	0	0
Custance, Mrs. M.	Brook Heath, Breamore, Salisbury	1	0	0
Cutcliffe, G.	Coombe House, Witheridge, N. Devon	1	0	0
Dairy Supply Company	Museum St., Bloomsbury, London	1	0	0
Dalgety, Frederick G.	Lockerley Hall, Stockbridge, Hants	1	0	0
†Damer, Capt. G. Dawson	Came, Dorchester		..	
Damerel & Son	161, Sidwell St., Exeter	1	0	0
Dampney, G. D.	Hinton, Ilchester	1	0	0
Dancey, T.	Melksham	1	0	0
Danger, Thomas	Rowford Lodge, Taunton	1	0	0
Daniel, Rev. H. A.	Manor House, Stockland, Bridgwater	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Daniel, H. T.	Manor House, Stockland, Bridgwater	.	.	
Daniel, Thos. C.	Stoodleigh, Tiverton	1	1	0
Darby, A. E. W.	Little Ness, Shrewsbury	1	0	0
Darby, E.	Liscombe, Dulverton	1	0	0
Darbyshire, C.	17, Tow Park, Riversdale, Ilfracombe	1	0	0
Darling, W. L.	Pewhill, Chippenham	1	0	0
Darnley, Earl of	Cobham Hall, Gravesend	5	0	0
Dartmouth, Earl of	Patshull Hall, Wolverhampton	2	0	0
Davenport, Rev. George	Foxley, Hereford	.	.	
Davey, J. Sydney	Brockym House, Helston, Cornwall	.	.	
Davey, Sleep, and Co.	Excelsior Plough Works, Plymouth	1	0	0
Davey, T.	Beer Manor Farm, Cannington, Bridgwater	1	0	0
Davies, J. N.	Gweleath, Cury, R.S.O., Cornwall	1	0	0
Davis, H. J.	Doulting, near Shepton Mallet	1	0	0
Davy, W.	Tracy Park, Bath	.	.	
Davy, W. H.	Chelwood House, Chelwood, near Bristol	1	0	0
Daw, J. E.	Spurbarne, Exeter	1	0	0
Daw, R. R. M.	Spurbarne, Exeter	2	0	0
Dawson, Hon. R.	Holne Park, Ashburton	1	0	0
Dawson, W. and F.	Market Place, Bath	1	0	0
Day, George Hill	Buckland Barton, Braunton, Barnstaple	0	10	0
Day, John	Huxham, E. Pennard, Shepton Mallet	1	0	0
Day, Son, and Hewitt	22, Dorset St., Baker St., London	.	.	
Deacon, W. A.	20, Birchin Lane, London, E.C.	.	.	
Dean, S.	Newport, Mon.	1	0	0
De Broke, Lord Willoughby	Compton Verney, Warwick	.	.	
De' Cetto, Col.	Brook Lodge, Holm Wood, Dorking, Surrey	1	0	0
De Mouilpied, T.	Secretary, Société Royale d'Agric., Manor Place, Guernsey	1	0	0
De Murrieta, A.	Wadhurst Park, Hawkhurst, Sussex	.	.	
Dendy, R.	West of England Annato Works, Bishop's Sutton, Bristol	1	0	0
Dendy, Rev. Samuel	Lattiford House, Wincanton	1	0	0
Dening, C., and Co.	Chard, Somerset	1	0	0
Denison, Rev. Archdeacon	East Brent, Somerset	1	1	0
De Vitre, H. Denis	Charlton House, Wantage	.	.	
Devonshire, Duke of, K.G.	Chatsworth, Derbyshire	5	0	0
Dickinson, A.	Kingweston, Somerton, Somerset.	1	0	0
Dickinson, W.	17, Cannon Place, Brighton	1	1	0
Dickson's, Limited	Chester	1	1	0
Digby, Lord	Minterne, Cerne Abbas	.	.	
Digby, J. K.	Sherborne Castle, Sherborne	1	0	0
Digby, J. K. W.	Sherborne Castle, Sherborne	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Dixon, C. B.	Clatford, Bevois Hill, Southampton	1	0	0
Dixon, G., & Sons	Victoria St., Bristol	1	0	0
Dodington, T. Marriott	Horsington, Yeovil	1	1	0
Drake, J. A.	Maidstone	1	0	0
Drake, T. C.	Butcombe Court, East Somerset	1	0	0
Dredge, James	Cutsey Trull, Wellington	1	0	0
Drewe, Major-General F. E.	The Grange, Honiton, Devon	1	1	0
Druce, A. F. Milton	Fyfield, Abingdon, Berks	1	0	0
*Ducie, Earl of	Tortworth Court, Falfield, R.S.O., Glos.	2	0	0
Duckering, C. E.	Whitehoe, Kirton Lindsey.	1	0	0
†Duckham, T.	Halmer, Hereford		..	
Duckworth, R.	The Cloisters, Bath	1	0	0
Dugdale, Major A. G.	Stock House, Sturminster Newton	1	0	0
†Dunboyne, Lord	Greendale, Clyst St. Mary, Exeter		..	
Dunn, William	Frome	1	0	0
†Duntze, Sir John, Bart.	Exleigh, Starcross, Devon		..	
†Durrant, Edward	Tunbridge Wells (Hon. Local Sec. 1881)		..	
Dyke, Thomas	Long Ashton Lodge, Clifton, near Bristol	1	0	0
*Dyke, Rt. Hon. Sir W. Hart, Bart., M.P.	Lullingstone Castle, Eynsford.	2	2	0
†Dymond, Edward E.	Oaklands, Apsley Guise, Woburn		..	
Dymond, Francis W.	Exeter	1	0	0
Eames, T. P.	Cotley Farm, Chard.	0	10	0
Easton, Richard	Heale Mount, Taunton	1	0	0
†Edgcumbe, E. R. Pearce	Somerleigh, Dorchester		..	
Edgington, Benjamin (Limited)	2, Duke Street, London Bridge	1	0	0
†Edmondson, A.	15, Alexandra Road, London, N.W.		..	
Edwards, C. L. Fry	The Court, Axbridge, Somerset	1	0	0
Edwards, A. P.	Hutton, Weston-super-Mare	1	0	0
Edwards, Jas.	Belmont, Flax Bourton, nr. Bristol	1	0	0
†Egmont, Earl of	Cowdray Park, Midhurst, Sussex		..	
Eldridge, Pope and Co.	Dorchester	1	0	0
*Ellesmere, Earl of	Worsley Hall, Manchester.	2	0	0
Elliott, F. M.	Biddestone, Chippenham	1	0	0
*Elliot, J. J.	Leigham House, Plympton	2	2	0
Ellis, E.	Summersbury Hall, Shalford, near Guildford.	1	0	0
Ellis, J.	Maidstone	1	0	0
*Elton, Sir E., Bart.	Firwood, Clevedon	2	2	0
Elworthy, Charles	Stone Farm, South Molton	1	0	0
Enys, F. G.	Enys, Penryn, Cornwall	1	0	0
Ernst, Major Henry	Wescombe House, Evercreech, Bath	1	0	0
Esdaile, C. E. T.	Cothelstone House, Taunton	1	0	0
Evans, Daniel	Winsford, Dulverton	0	10	0

Name.	Residence.	Subscriptions. £.	s.	d.
Evans, H. J.	Greenhill, Whitchurch, Cardiff	1	0	0
Evans, W. H.	Ford Abbey, Chard	1	0	0
Evan-Thomas, Commander A.	Cae Rwnon, Builth		.	.
Eyre, C.	Welford Park, Newbury		.	.
Farthing, Herbert	Thurloxton, Taunton	1	0	0
Farwell, F. Geo.	Laura Place, Bath		.	.
Faunce de Laune, C. de L.	Sharsted Court, Sittingbourne	1	0	0
Fellows, J. H.	Kingston Park, Dorchester	1	0	0
Fenn, T.	Ludlow Estate Offices, Downton Castle, Bromfield, Salop	1	0	0
Fooks, Thos.	Totnell Corner, Sherborne, Dorset	1	0	0
Field, Barclay	26, Hill Street, Berkeley Square, London	2	2	0
Fife, Capt. W.	Sandley House, Gillingham, Dorset	1	1	0
File, C.	Elham, Canterbury	1	0	0
Filliter, F.	St. Martins House, Wareham	1	0	0
†Finch, C. H. M.	Salisbury		.	.
Firth, F. H.	Cator Court, Ashburton	1	0	0
Fish, George J.	Selworthy, Taunton	1	0	0
Fisk, J. R.	Brightstone, Isle of Wight	1	0	0
Fitzhardinge, Lord.	Berkeley Castle, Gloucestershire		.	.
Fletcher, C. E.	Kenward, Yalding, Maidstone	1	0	0
Fletcher, Lionel J. W.	Ewell Manor, West Farleigh, Maidstone		.	.
Flower, George F. Applin	The Buildings, Stafford Farm, Dorchester		.	.
Flower, James	Chilmark, Salisbury	1	0	0
Flower, R. F.	The Hill, Stratford-on-Avon	1	0	0
Flower, Rev. W.	Worth Vicarage, Dover	1	1	0
Foley, Son & Mundy	Trowbridge	1	0	0
Ford, Henry	Lower House, Branscombe, Sidmouth	2	2	0
Ford, —	Wraxall Court, Nailsea, near Bristol	1	0	0
Ford, Major A. E.	4, Orme Square, Hyde Park, London	1	0	0
Forster, J. C.	Clatford Mills, Andover	1	0	0
Forster, W. S.	Gore Court, Maidstone	1	0	0
Fortescue, Earl	Castle Hill, South Molton	2	0	0
Foster, R. L.	Wells, Somerset	1	0	0
Foster, W.	Ripple Vale, Deal, Kent	1	0	0
Fowler and De la Perrelle.	Gloucester Square, Southampton	1	0	0
Fowler, Richard	Broughton, Aylesbury	1	0	0
Fowler, W. H.	Taunton	1	0	0
Fox Brothers and Co.	Wellington, Somerset	1	0	0
Fox, Dr.	16, Gay Street, Bath	1	0	0
Fox, Robert	Falmouth		.	.

Name.	Residence.	Subscriptions. £.	s.	d.
Foxcroft, E. T. D.	Hinton Charterhouse, Bath	1	0	0
Francis, William	Winstout, Crediton	0	10	0
Franklen, Col. C. R.	Clemenstone, Bridgend	1	0	0
Franks, J.	Nempnett Thrubwell, Wrington, R.S.O.	1	0	0
Freeman, H. W., M.D.	24, Circus, Bath	1	1	0
Freeman, J.	Rhayader	1	0	0
Freeth and Pocock	74, Wandsworth Road, London	1	0	0
Froom, Robert	Broad Clyst	1	0	0
Fry, John S.	7, Cathedral Green, Wells	1	0	0
Fry, W.	Stoney Stratton, Evercreech	1	0	0
†Fryer, William Rolles	Verwood Manor, Salisbury		. .	
Fuller, E. R.	The Hill, Batheaston	1	1	0
†Fuller, G. Pargiter, M.P.	Neston Park, Corsham		. .	
Fuller, R. W.	37, High Street, Croydon	1	0	0
Fuller, S. and A.	Bath	1	0	0
Fursdon, Charles	Fursdon, Tiverton, Devon	1	0	0
†Galloway, W. G.	Cridland Farm, Spaxton, Bridgwater		. .	
Gammin, Joseph	West Holwell, Parncombe, N. Devon	1	0	0
Gardiner, Alfred, and Sons	Nelson Street, Bristol	1	1	0
Gardner, Adam	Butsper, Launcells, Holsworthy	0	10	0
Gardner, W.	Chippenham	1	0	0
*Garratt, Lt.-Col. T. A. T.	Bishop's Court, Exeter	2	2	0
Garth, T. C.	Haines Hill, Twyford	0	10	0
Gear, W. H.	Union Street, Bath	1	1	0
Geare, John	Exeter	1	1	0
*†George, William E.	Howe Croft, Stoke Bishop, Bristol		. .	
Gerrish, J.	Chipping Sodbury	1	0	0
†Gibbons, G.	Denman St., Borough, High St. London, S.E.		. .	
Gibbons, George	Tunley, near Bath	1	0	0
Gibbons, J. V.	Haseley Iron Works, Tetsworth, Oxon	1	0	0
Gibbons, Sinnock and Co.	Counterslip, Bristol	1	0	0
†Gibbs, Antony	Tyntesfield, Bristol		. .	
Gibbs, C.	Laddingford, Yalding	1	0	0
†Gibbs, H. M.	Barrows Court, Flax Bourton, R.S.O., Somerset		. .	
Gibbs, Jas., and Co.	16, Mark Lane, London	1	0	0
Gibbs, William S.	Batts Park, Taunton	1	1	0
Gifford, Samuel L.	253, High Street, Exeter	0	10	0
Gilbey, W.	Cambridge House, Regent's Park, London	1	0	0
Giles, P. B.	The Quinton, Brobury, nr. Hereford	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Gill, Frederick	Speenhamland, Newbury	1	1	0
Gill, Alfred	St. James Street, Brighton.	1	1	0
Gilling-Gilling, Capt. T.	Manor House, Bathford, near Bath	1	0	0
†Gladstone, J.	Bowden Park, Chippenham		. .	
Glass, F.	Ellicombe House, Dunster, Minehead	1	0	0
*Glyn, Sir Richard G., Bart.	Gaunt's House, Wimborne	2	2	0
Glynn, W. A.	Seagrove, Sea View, Isle of Wight	1	0	0
Goddard, A. L.	The Lawn, Swindon	1	0	0
‡Godman, C. B.	Woldringfold, Horsham.		. .	
Godman, Capt. J.	Park Hatch, Godalming	1	0	0
Goldney, G. Prior	Derriads, Chippenham	1	0	0
Goldney, Sir G., Bart.	Beechfield, Corsham	1	0	0
Goodden, J. R. P.	Compton House, Sherborne	1	0	0
Goodford, A. J.	Chilten Cantels, Ilchester	1	0	0
Goodman, A.	3, Hammett Street, Taunton	1	0	0
Goodwin, J.	Priory Court, Cheltenham	1	0	0
Gore-Langton, W. F.	2, Princes Gate, London, W.	1	0	0
Goring, C.	Wiston Park, Steyning	1	0	0
*Goring, Rev. John	Wiston Park, Steyning	2	2	0
†Gorringe, Hugh	Kingston-by-Sea, Brighton		. .	
Goschen, Right Hon. G. J., M.P.	69, Portland Place, London, W.	1	0	0
Gottwaltz & Bowring	Horse Exchange, Cardiff	1	0	0
Grace, A. R.	Elmside, Sneyd Park, Bristol	1	0	0
Graham, George	The Oaklands, Birmingham	1	0	0
Grant, W. J. A.	Hillesdon, Cullompton	1	0	0
*Gray, Mrs.	3, Airlie Gardens, Campden Hill, London, W.	2	2	0
†Green, H. L.	Ville Amphrey Farm, St. Martin's, Guernsey		. .	
Green, R.	The Whittern, Kington, Herefordshire	1	0	0
Gregory, G. B., M.P.	Boarzell House, Hurst Green, Sussex	1	0	0
Grenfell, Arthur R.	4, Savile Row, London, W.	1	0	0
Griffin, B.	New House, Broad Clyst, Exeter	1	0	0
Griffin, J.	Portway House, Ken, Yatton.	1	0	0
Grove, Sir T. Fraser, Bart., M.P.	Fern House, Salisbury	1	0	0
*†Guest, Merthyr	Inwood, Henstridge, Blandford		. .	
Gunn, G.	Victoria Mills, Bath	1	1	0
Gunning, G.	Feltham Farm, near Frome	1	0	0
Guyon, Rev. H. C.	The Rectory, Lamyat, Bath	1	0	0
Hall, A. W., M.P.	St. Thomas's House, Oxford	1	0	0
†Hall, J. F.	Sharcombe, Wells		. .	
Hall, W. J.	Coventry Farm, Wroughton, Swindon	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Ham, J., jun.	Broadclyst, Exeter	0	10	0
Ham, William	Worridge, Collumpton	0	10	0
†Hambro, C. J. T., M.P.	Milton Abbey, Blandford		. .	
†Hambro, Everard A.	Hayes Place, Beckenham, Kent		. .	
Hamilton, Hon. Mrs. A. B.	Combs, Stowmarket	1	0	0
Hammond, A.	Royal Crescent, Bath	1	1	0
†Hampden, Viscount	Glynde, near Lewes		. .	
Hanbury, S.	Bishopstowe, Torquay	1	0	0
Hancock, Rev. F.	Selworthy, Somerset	1	0	0
Hancock, J. D.	Halse, Taunton, Somerset	1	0	0
*Hancock, W.	The Bank, Wiveliscombe	2	2	0
Handley, J.	Green Head, Milnthorpe, Westmoreland	1	0	0
Hanham, R.	Wraxall, Shepton Mallett	1	0	0
Hanley, C. A.	Queen St., Oxford	1	0	0
Harbord, Rev. H.	East Hoathley Rectory, Hawkhurst, Sussex	1	0	0
Harbottle, E.	Topsham	1	0	0
Harding, R.	Fenswood Farm, Long Ashton	1	0	0
Harding, T. K.	Ashton Gifford House, Codford, Bath	1	0	0
Harding, Webber	Highercombe, Dulverton	1	0	0
Hardinge, Viscount	South Park, Penshurst	1	1	0
Hardy, C.	Gittisham, Honiton	1	1	0
Harford, W. H.	Old Bank, Bristol	1	0	0
Harris, J.	Fletchamstead, Coventry	1	0	0
Harris, Nicholas	Sherrick, Launcells, Holsworthy	0	10	0
Harrison, G.	Underpark, Lealholm, Grosmont, Yorks	1	0	0
Hassell, J.	Inglescombe, Bath	1	0	0
Hathaway, G.	Royal Prize Churn Works, Chippenham	1	0	0
Hawke, W., C.A.	Kernock, St. Mellion, Cornwall, R.S.O.	1	0	0
Hawkes, T.	Williton, Taunton	1	0	0
†Hawkins, J. Heywood	Bignor Park, Petworth		. .	
Hawkins, Rev. J. B. H.	Rectory, Chelwood, Bristol.	1	0	0
Hayes, F. J.	West Pennard, Glastonbury	1	0	0
Haynes, J. G.	The Briars, Sanford Churchill, Bristol	1	0	0
Hayter, J.	Stourton Caundle, Blandford	1	0	0
Hayter, Sir A., Bart.	Trevina, Tintagel, Cornwall	1	0	0
Hayter-Hames, C. G.	Chagford, Newton Abbott	1	0	0
Hayward, W.	Boyd's Farm, Corsham	1	0	0
Heard, H.	Shepton Mallet	1	0	0
Heasman, A.	Calceto, Arundel	1	0	0
Heasman, J. E.	Ecclesden Manor, Angmering, Arundel	1	1	0
*Heathcoat-Amory, Sir J. H., Bart.	Tiverton, Devon	2	2	0
Heathcote-Amory, J. M.	Knightshayes, Tiverton	1	0	0
Helme, Captain Burchell	Bishopstrow House, Warminster.	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Ielyar, Major G.	Poundisford, Taunton	1	0	0
Ierbert, Thomas	Even Farm, Cirencester	1	0	0
Iesse, F. W.	Wrington, R.S.O., Som.	1	0	0
Iewett, Henry T.	Norton Court, Taunton	1	1	0
Ieyworth, Colonel L.	Palstre Court, Wittersham, Ashford, Kent	1	0	0
Iiern, W. P.	The Castle, Barnstaple	1	0	0
Hill, B. H.	Belluton House, Pensford, Bristol	.	.	
Hill, Charles	Clevedon Hall, Somerset	.	.	
Hill, Col. E. S., C.B.	Rookwood, Llandaff	.	.	
Iill, E.	Evercreech, Bath	1	0	0
Iill, E.	Stratton House, Evercreech, Bath	1	0	0
Iill, Sidney	Langford House, Langford, R.S.O.	1	1	0
Iillard, J.	Hook Farm, Stoke Trister, Wincanton	1	0	0
Iillman, J.	3, Gracechurch St., London, E.C.	1	0	0
Iine-Haycock R. W.	Belmont, Sidmouth	1	0	0
Iippisley, Edwin	Wells, Somerset	1	0	0
Hippisley, J. H.	Stone Easton, Old Down, Bath	.	.	
Iiscock, A., jun.	Manor Farm, Motcombe	1	0	0
Hoare, C. A. R.	37, Fleet Street, London	2	2	0
Hoare, C.	37, Fleet Street, London	2	0	0
Hoare, W.	Staplehurst	2	0	0
Hobhouse, H., M.P.	Hadspen House, Castle Cary	2	0	0
Hockin, Edward	Poughill Vicarage, Stratton, Cornwall	.	.	
Ioddinott, E.	Stratton St. Margaret, Swindon	1	0	0
Ioddinott, S.	Worminster Farm, Shepton Mallett	1	0	0
†Hodgson, J. Stewart	Lythe Hill, Haslemere, Surrey	.	.	
Iole, George	Corton Denham, Sherborne	0	10	0
Iole, Henry	Hazlebury, Plucknett, Crewkerne	0	10	0
Holdsworth, Henry M.	Wilton, near Salisbury	.	.	
Holford, R. Steiner	Weston Birt House, Tetbury	2	2	0
Iolland, J.	Keynsham, Bristol	1	0	0
Iollond, J. R.	Wonham, Bampton, Devon	1	0	0
Iolmes, E. Carleton	Brookfield, Arundel	1	0	0
Holmes and Sons	Prospect Place Works, Norwich	2	2	0
Iolt, W. D.	Manor Farm, Castle Cary, Somerset	1	0	0
Hood, Sir A. Acland, Bart.	St. Audries, Bridgwater	5	0	0
Hood, The Hon. Col.	8, Grosvenor Gardens, London, S.W.	.	.	
Iooman, T. C.	Fernleigh, Ditton, Maidstone	1	0	0
Hooper, R. N.	Stanshawes Court, Chipping Sodbury	.	.	
Horner, J. F. Fortescue	Mells Park, Frome	.	.	
Iornsby and Sons (Limited)	Grantham, Lincoln	1	1	0
Iorton, J.	Rabson Farm, Winterbourne Bassett, Swindon	1	0	0
Iosegood, Obed., jun.	Dillington, Ilminster	0	10	0
Iosken, W. and Son	Loggans Mill, Hayle, Cornwall	1	0	0

Name.	Residence.	Subscriptions. £.	s.
How, J. H.	Woodville, Bideford	1	0
Howard, E. S.	Thornbury Castle, Glos.	1	0
Howard, Hon. Mrs. C.	Dutchlands, Great Missenden	1	0
Howard, J. and F.	Britannia Works, Bedford.	1	0
Howse, H. J.	London, Gloucester, and N. Hants Dairy Co., Bristol	1	0
Howse, John	Stamborough, Washford, Taunton	1	0
Hubbard, W. E.	Leonards Lee, Horsham	1	0
Hubble, W. L.	Allington, Maidstone	1	0
†Hughes, A. E.	Wintercott, Leominster	.	.
Hughes, James	Wood Lawn, Oxford	1	1
Hughes, J. J.	The Heath, Boar's Hill, Abingdon	1	0
Hulkes, C. J. G.	Pettinge, Ash next Wrotham, Sevenoaks	1	0
Hull, R.	Thornend Farm, Christian Malford	1	0
†Hulse, Sir Edward, Bart.	Breamore, Salisbury	.	.
Hume-Webster, J.	Marden Deer Park, Caterham Valley, Surrey	1	1
Humphries, E.	Pershore, Worcester	1	0
Hunter, J.	Seed Merchant, Chester	1	0
Hunter, Sir Paul, Bart.	Mortimer Hill, Reading	1	0
Hurford, H. R.	Brightlands, Stockbridge, Hants.	1	1
Hurst and Son	152, Houndsditch, London	1	0
†Hussey, Col.	Highcliffe, Lympstone, Devon	.	.
Hussey, John Richards	Beechcroft, St. Davids, Exeter	0	10
Hutchings, R. R.	High Street, Wincanton	1	0
Huth, L.	Possingworth Manor, Waldron, Sussex	1	0
*Hylton, Lord	Charlton, near Radstock	2	2
*†Ilchester, Earl of	Melbury, Dorchester	.	.
Imbert-Terry, H. M.	Woodlands, Kennford, near Exeter	1	0
Ingram, Lieut.-Col. R. B.	Steyning, Sussex	1	1
Innes, Major J.	Merton, Surrey	1	0
Ireland, J. C. C.	Brislington Hall, near Bristol	1	0
Ison, Kidman, and Watts.	57, Corn Market St., Oxford	1	0
Jackson, W.	Manor House, Dawlish, Devon	1	0
James, Alfred B.	Shovell Hill House, North Petherton, Bridgwater	1	1
James, James	Les Vauxbelets, Guernsey	1	0
Jefferis, W. H.	Hill House, Henbury, near Bristol	1	0

Name.	Residence.	Subscriptions. £.	s.	d.
Jenkin, S. W.	Liskeard, Cornwall	0	10	0
Jersey, Earl of	Middleton Park, Bicester, Oxon	2	0	0
Jonas, F. N.	Crishall Grange, Saffron-Walden		..	
Jonas, George	Ickleton, Saffron-Walden		..	
Jones, Henry Parr	Portway House, Warminster		..	
Jones, Major F. J.	Chippenham	1	1	0
Jones, Winslow	Exeter	1	1	0
Keary, A. J.	Chippenham	1	0	0
Keen, J. R.	Chewton Farm, Ston Easton, Bath	1	0	0
Keene, James B. and Co.	*Journal* Office, Bath	1	0	0
Keevil, C.	Blagdon Stud Farm, Maldon, Surrey	1	0	0
Kell and Co.	Gloucester	1	0	0
Kemble, C. A.	East Wood, E. Harptree, Blagdon, R.S.O.	1	0	0
Kemble, Henry	Overtown, Swindon, Wilts	1	0	0
Kennard, Rev. R. B.	Marnhull Rectory, Blandford.	1	0	0
Kennaway, Sir J. H., Bart., M.P.	Escot, Ottery St. Mary.	1	1	0
Kennedy, D.	The Forbury, Reading	1	0	0
Kettlewell, W. W.	East Harptree Court, Bristol		..	
Kidner, John	Nynehead, near Wellington, Som.	1	0	0
Kindersley, E. L.	Clyffe, Dorchester	1	0	0
King, Francis Thornley	15, Queen Square, Bath	1	1	0
King, J. Goddard	Beaton, Newbury		..	
King, R. Moss	Ashcott Park, Bridgwater	1	0	0
King and Son, R.	Milsom Street, Bath	1	0	0
King, Sir Wm. D.	Lynwood, Waverley Rd., Southsea	0	10	0
Kingscote, T.	The Trench, Tonbridge	1	0	0
Kinnear, H.	Redville, Swindon	1	0	0
Kirkpatrick, J.	Horton Park, Hythe.	1	0	0
Kittow, E. P.	Patrida, Linkinhorne, Cornwall, R.S.O.	1	0	0
Knapman, A.	Loxbeare, Tiverton	0	10	0
Knatchbull, W.	Brightlingsea, Essex	1	0	0
Knight, Sir F. W., Bart.	Simonsbath, South Molton		..	
Knight, R.	Luccombe, Minehead	0	10	0
Knollys, C. R.	Fitzhead Court, Taunton		..	
Knollys, J. E.	Fitzhead Court, Taunton	1	0	0
Kruse, W.	Leeds, near Maidstone		..	
Lake, C.	Oakley, Higham, Rochester	1	0	0
Lakeman, Thos.	Brixham, Devon	0	10	0
Lamb, H. R.	Torquay	1	0	0

Name.	Residence.	Subscription. £.	s.
Lamoreaux, G.	6, Bovingdon Villas, Plympton	1	1
Lamport, Messrs. C.	Bindon House, Wellington	1	0
Lance, C. E.	Stoke Court, Taunton	1	0
Lane, A. P.	Plas Power, Wrexham	1	0
Langdon, C.	Penrocks Lodge, Chard	1	0
Langley, B. W.	King's Lynn, Norfolk	1	1
Langworthy, W. F.	Clevedon, Somerset	1	0
Lankester and Co.	110, Southwark Street, London	1	0
Lansdown, H. J.	Colestock, Ottery St. Mary, Devon	1	0
*Lansdowne, Marquis of	Bowood, Calne	2	0
Lascelles, Rev. E.	Newton St. Loe, Bristol	1	0
Lanxon, W.	Lostwithiel, Cornwall	1	0
Laurie, Colonel R. P., M.P.	55, Eaton Place, London	1	0
Laver, R.	Kingweston, Somerton	1	0
Laver, S.	St. Georges, Worle, Weston-super-Mare	1	0
Leach, R.	Half Moon Hotel, Yeovil	1	0
Le Brocq, Francis	St. Peter's, Jersey	1	0
*Leconfield, Lord	Petworth, Sussex	2	0
Legg, E. Gapper	Melplash Court, Melplash, Dorset	1	0
Legg, Job	Bridport, Dorset	1	1
Leir, Major W.	Combe-head, Bampton, N. Devon	1	0
Leney, H.	Blacklands, East Malling, Maidstone	1	1
*Lennard, Col. Sir J. Farnaby, Bart.	Wickham Court, Beckenham, Kent	3	0
Lethbridge, Charles	Sherfield Manor, Basingstoke	1	0
†Lethbridge, J. C. Baron	Tregeare, Launceston	.	.
*Lethbridge, W.	Courtlands, Lympstone	2	0
Leverton, W.	Woolleigh Barton, Beaford, North Devon	0	10
Lewis, James	Plasdraw, Aberdare	1	1
Lewis, Wm. and Son	*Herald* Office, Bath	1	0
†Ley, John Henry	Trehill, Exeter	.	.
Ley, Richard	Maervale, Exmouth	1	0
Liddon, E., M.D.	Silver Street House, Taunton.	1	0
Liddon, J.	Great Toller, Dorchester	1	0
Lipscomb, R. H.	East Budleigh, Budleigh Salterton, Devon	1	1
†Lisburne, Earl of	Crosswood, Aberystwith, S. Wales	.	.
†Lister, J. J.	Warninglid Grange, Haywards Heath	.	.
Lister, R. A., and Co.	Dursley, Gloucestershire	1	1
Llewellyn, Evan H., M.P.	Langford Court, Langford, Bristol	1	1
*Llewellyn, Sir J. D., Bart.	Penllergare, Swansea	2	2
Lloyd, J. B.	Wilmington Hall, near Dartford	1	0
Lloyd, Thomas	The Square, Winchester	1	0
Lock, J. C.	Saltford, near Bristol	1	0
Lock, M.	Chancellor's Farm, Wrington, Bristol	1	0
†Locke, John Arthur	Northmoor, Dulverton	.	.

Name.	Residence.	Subscriptions. £.	s.	d.
Locke, R. G. E.	Hollingbourne House, Maidstone	1	0	0
Lockyer, C.	Gouts Mills, Bruton	0	10	0
Londesborough, Earl of	Londesborough Park, Market Weighton	1	0	0
Long, J.	Stanbridge Hall, Romsey, Hants.	1	0	0
†Long, Walter H., M.P.	97, Eaton Place, London, S.W.		..	
Long, Walter Jervis	The Holt, Bishop's Waltham	1	0	0
Long, Col. William	Woodlands, Congresbury, Somerset	1	1	0
Long, William	Windmill Cottage, Oldbury-in-the-Hill, Chippenham	0	10	0
Lopes, Sir M., Bart.	Maristow, Roborough, Devon	2	0	0
Lopes, H. Y. Buller	Maristow, Roborough, Plymouth.	1	0	0
Lovelace, Amos	Winsford, Dulverton	0	10	0
Lovelace, Earl of	Ashley Coombe, Porlock, Somerset	1	0	0
†Loyd, Lewis	Monk's Orchard, Bromley, Kent		..	
Lubbock, Sir John, Bart., M.P.	High Elms, Hayes, Kent		..	
Lucas, R. T. S.	Tudor Hall, Ashley Down, Bristol	1	0	0
Luff, J. P.	Rudmore, Evercreech	1	0	0
Lushington, E. H.	Treasurer's House, Guy's Hospital, London	1	0	0
Lutley, J. B.	Brockampton, Worcester		..	
Luttrell, Rev. A. H. F.	Minehead, Bridgwater	1	0	0
Luttrell, G. F.	Dunster Castle, Somerset	1	0	0
Luttrell, Col. H. A. F., C.B.	Badgworth Court, Axbridge, R. S. O., Somerset	1	0	0
Lyde, W.	Stowey, Pensford, Bristol	1	0	0
Maby, C. R.	Storridge Farm, Westbury, Wilts	1	0	0
MacAndrew, J. J.	Lukesland, Ivybridge	2	0	0
Macleay, Col. A. C.	Glasshayes, Lyndhurst	1	0	0
Maggs, C.	Dairy Factory, Melksham	1	0	0
Major, H. J., and C.	Bridgwater	1	0	0
Mallock, Richard	Cockington, Torquay	1	0	0
Manchester, J.	St. John, New Brunswick, Canada	1	0	0
Manfield, J.	Hambridge, Curry Rivell, Taunton	1	0	0
Mansell, A. E.	Astol, Shifnal, Salop		..	
Marker, Richard	Combe, near Honiton	1	0	0
Marshall, Sons, and Co.	Britannia Iron Works, Gainsboro'.	1	1	0
Marshall, W.	Lunstone, near Bude	0	10	0
Martin, Christopher	Broad Clyst, Exeter	0	10	0
Martin, G. E.	Ham Court, Upton-on-Severn		..	
Martin, T.	Alston House, Plympton St. Mary	2	0	0
Martin, W.	Burrow, Broad Clyst, Exeter	0	10	0
Mason, J.	Eynsham Hall, Oxon	2	0	0
Matthews, A. T.	Lingfield, Surrey	1	0	0
Mattock, Robert	Sowton House, Wellington	1	0	0
Maule, M. St. John	Chapel House, Bath	1	0	0

Name.	Residence.	Subscription. £.	s.
May, A. C.	Park House, Cotham Park, Bristol	1	0
May, W. J.	Farleigh Farm, Tiverton	1	0
†Mayo, Henry	4, Temple Terrace, Dorchester	.	.
†Mayo, John	Wavey House, Upwey, Dorchester	.	.
McMurtrie, J.	Southill, Radstock, near Bath	1	0
McNiven, Rev. C. M.	Perrysfield, Oxted, Redhill	1	1
Medland, R.	Penstone, Cullompton	1	0
Medland, W. R.	Yard Farm, Silverton, Cullompton	0	10
Medlicott, Henry E.	Potterne, Devizes	1	0
Merry, Richard	Goulds, Broad Clyst, Exeter	0	10
Merry, W. F.	Ash Clyst, Exeter	1	0
Merson, R. C.	Maristow Cottage, Roborough, S. Devon	1	0
Merson, Thomas	Holcombe Rogus, Wellington, Somerset	0	10
Methuen, Hon. Col. P.	Corsham Court, Wilts	1	0
Micklem, H.	Rose Hill, Henley-on-Thames	1	0
Middleton, Hastings N.	Bradford Peverell, Dorchester	1	0
Middleton, H. B.	Bradford Peverell, Dorset	1	0
*Mildmay, H. Bingham	Flete House, Ivybridge, Devon	2	2
Mildmay, Capt. C. B. St. J.	Hallam, Dulverton	1	0
Mildmay, Rev. A. St. J.	Denton Rectory, Harleston, Norfolk	1	0
*†Mildmay, Sir H. St. John, Bart.	Dogmersfield Park, Hartford Bridge, Winckfield	.	.
Mildon, W. B.	North Street, Wellington, Somerset	0	10
†Miles, H. R.	Abbots Leigh, Clifton, Bristol	.	.
Millar, C. F.	Kingsweston Estate Office, Shirehampton, Bristol	1	0
Millard, H.	Shrivenham, Berks	1	0
Mills, A.	Efford Down, Bude Haven, Cornwall	1	0
Minton, T. S.	Montford, Shropshire, R.S.O.	1	0
Mirehouse, Henry	St. George's Hill, Easton-in-Gordano	1	1
†Mitchell, F. J.	Llanfreckfa Grange, Carleon, Mon.	.	.
Monk-Bretton, Lord.	8, Seamore Place, London.	1	1
Montagu, Lord	Palace House, Beaulieu, Hants	1	0
Montagu, J. M. P.	Downe Hall, Bradpole, Bridport	1	0
Montefiore, Sir F., Bart.	Worth Park, Crawley	1	1
Moody, C.	Pylle, Shepton Mallet	1	0
Moody, R.	Pilton, Shepton Mallet	1	0
Moon, H.	Mill Batch Farm, Mark, Som.	1	0
Moore, Frank R.	Littlecott Farm, Pewsey, Wilts	1	0
†Moore, H. F., F.C.S.	5, Claremont Road, St. Margaret's, Twickenham	.	.
Moore, J. O.	Rochester	1	0
*Moore-Stevens, J. C.	Winscott, Gt. Torrington	5	0
*Moreton, Lord	Tortworth Court, Falfield, R.S.O., Gloucestershire	2	2
Morgan, E. K.	Hambrook, near Bristol	1	0
Morgan, G. K.	Cherith Lodge, Clifton	1	1

Name.	Residence.	Subscriptions £.	s.	d.
organ-Richardson, C.	Noyadd Wilym, Cardigan	1	0	0
orland, Charles W.	Elmscroft, West Farleigh, Maidstone	1	1	0
Morley, Earl of	Saltram, Plympton, Devon	2	0	0
Morley, H. H.	Hall Place, Tonbridge	.	.	
Morrell, G. Herbert	Headington Hill Hall, Oxford	2	2	0
orris, H. S.	Woolston Lodge, Southampton	1	0	0
orris and Griffin	Elmsdale, Wolverhampton	1	1	0
Morrison, Alfred	Fonthill House, Tisbury	.	.	
Mount-Edgcumbe, Earl of	Mount-Edgcumbe, Devonport	2	2	0
Mount, G. W.	Wasing Place, Reading	.	.	
oysey, Rev. F. L.	91, Kensington Gardens Square, London, W.	1	1	0
Moysey, H. G.	Bathealton Court, Wiveliscombe, Somerset	2	2	0
Mucklow, E.	Castlehead Grange, Lancashire	.	.	
ullock, R.	Newport, Mon.	1	1	0
untz, P. A., M.P.	Dunsmore, near Rugby	1	0	0
Murch, Jerom	Cranwells, Bath (Mayor, 1864–6, 1876–8, 1887)	2	0	0
urray-Anderdon, H. Edward	Henlade House, Taunton	1	1	0
yddleton, Thomas.	Beckjay, Ashton-on-Clun	1	0	0
aper, Col. W. D.	Stanley Lodge, Exmouth	1	0	0
apier, A.	Heatherton Grange, Bradford, near Taunton	1	0	0
apier, H. B.	Chippenham	1	0	0
apper, G.	Lee Farm, Wisboro' Green, Billingshurst, Sussex	1	1	0
Naylor, C. J.	Kerry, Montgomeryshire	.	.	
eame, F.	Macknade, Faversham	1	1	0
Neville-Grenville, Robert	Butleigh Court, Glastonbury	.	.	
ewbery, Samuel P.	Plympton St. Mary	1	0	0
ewton, F. M.	Barton Grange, Taunton	1	0	0
ewton, F. W.	Barton Grange, Taunton	1	0	0
Newton, J. G.	Millaton House, Bridestowe, Okehampton	.	.	
icholets, J. T.	Manor House, Brent Knoll, Bridgwater	1	0	0
ichols, George	Broad Street, Bristol	1	0	0
ix, Mrs. S.	Tilgate, Crawley, Sussex	1	0	0
oakes, J., jun.	The Cage, Tunbridge	1	0	0
ock, E.	Brockton House, Shifnal, Salop	1	0	0
Normanton, Earl of	Somerly, Ringwood, Hants	2	0	0
orris, Charles	Mosshayne, Clyst, near Exeter	1	0	0
orris, T. F.	Highbridge, Somerset	1	0	0
orrish, Thomas	Churchill Farm, Loxbeare, Tiverton	0	10	0
orthcote, Hon. Sir H. S., Bart., M.P.	7, Seamore Place, Mayfair, London	1	0	0

Name.	Residence.	Subscription £.	s.
Northey, W. S.	Tinhay Lime Works, Lifton, Devon	1	0
*Northumberland, Duke of	Albury Park, Surrey	5	0
Nutt, H. J.	Fillongley, Coventry	1	0
O'Donoghue, H.	Long Ashton, Bristol	1	0
Okeden, Col. U. P.	Turnworth, Blandford	1	0
Olde, J. C.	Grove, Launcells, Holsworthy	0	10
Oliver, J.	Berkeley, Gloucester	1	0
Osborn, J.	Chesterblade, Shepton Mallet	1	0
Oxley, J. Stewart	Fen Place, Turner's Hill, Sussex	1	1
Page, Henry	Walmer Court, Walmer	1	0
*Paget, Col. Sir R.H., Bt., M.P.	Cranmore Hall, Shepton Mallet	2	0
Pain, Charles	Longstock, Stockbridge, Hants	1	1
Palairet, H. H.	Chatley House, Norton St. Philip, Bath	1	1
Palfreman, L.	Ingrams Farm, Loxbeare, Tiverton	0	10
Palmer, G. W.	Elmhurst, Reading	1	0
†Palmer, R.	Lodge Farm, Nazeing, Waltham Cross	.	.
Palmer, W.	Elbury, Broad Clyst, Exeter	1	0
Palmer, W. J.	Reading	1	0
Parfitt, J.	Selwood Dairy, Frome	1	0
Parker, Admiral	Delamore House, Ivybridge	1	0
†Parker, Hon. Cecil J.	Eaton Estate Office, Eccleston, Chester	.	.
Parker, J. S.	Freelands, Iffley, Oxford	1	0
Parkin, Paxton William	3, Major Terrace, Seaton, Devon	1	0
†Parmiter, Wm	The Axe, Crewkerne	.	.
Parnell, T. P.	Wrington, R.S.O., near Bristol	1	0
Parrington, M. B.	Holborough Cottage, Rochester	1	0
Parry, T.	Newport, Mon.	1	0
†Parsons, Henry	Misterton, Crewkerne	.	.
Partridge, S. J.	Selworthy, Taunton	1	0
Pavord, A. C.	Maindiff Court Farm, Abergavenny	1	0
Peacock, E.	14, Union Street, Bath	1	0
Pease, W. B.	Southstoke, Bath	1	0
Peel, Edw. L.	Woodcroft, Cuckfield, Sussex	1	0
Pember, G. H.	Tangier Park, Basingstoke	1	0
Pendarves, W. Cole	Pendarves, Camborne, Cornwall	1	1
Pendock, C.	Ditchen Farm, Mangotsfield	1	0

Name.	Residence.	Subscriptions. £.	s.	d.
Penny, Thomas	Taunton	1	0	0
Percival, E. A.	Severn House, Henbury	1	1	0
Perry-Herrick, Mrs.	Beau Manor Park, Leicestershire	.	.	
Perry-Keene, H.	Rowfant, Crawley, Sussex	1	0	0
Peters, Wm. Parsons	Yealbridge, South Petherton	.	.	
Petherick, S.	Acland Barton, Landkey, Barnstaple	0	10	0
Petley, J. McLeod	Greenhouse, Bridgnorth	1	1	0
Pettifer, Stephen	Crudwell, Tetbury	1	0	0
Philp, Capt.	Pendoggett, Timsbury, near Bath	1	1	0
†Phillips, C. D.	Newport, Monmouth	.	.	
Phillips, G. Cawkwell	60, New Street, Chelmsford	1	0	0
Phillips, T.	Abingdon House, West Malling, Kent	1	0	0
Phipps, C. N. P.	Chalcot, Westbury	1	0	0
Phœnix Oil Mills Co.	Norfolk Street, Liverpool	1	1	0
Pickett, S., jun.	Elcombe, Swindon	1	0	0
Picksley, Sims, and Co., Lmtd.	Bedford Foundry, Leigh	1	0	0
Piggott Brothers	59, Bishopsgate Street Without, London	1	0	0
Pigott, Cecil S.	Weston-Super-Mare	1	0	0
†Pinckney, Erlysman C.	Berwick St. James, Salisbury	.	.	
Pine, D.	Clarendon Place, Maidstone	1	0	0
Pinney, F.	The Grange, Somerton	1	0	0
†Pinney, R. W.	Somerton	.	.	
†Pinney, W.	Somerton	.	.	
Pinnock, W.	Littleworth House, Wantage	1	0	0
†Pitt, Thomas, jun.	Southside Street, Plymouth	.	.	
Pocock, H.	Cuckoo Bush Farm, Lacock, Wilts	1	0	0
Pocock, J.	Caden Lane Farm, Foxham, Chippenham	1	0	0
†Pole, R. Chandos	Sydling Court, Sydling, Dorchester	.	.	
*Poltimore, Lord	Poltimore Park, Exeter.	3	3	0
Polwhele, Thos. R.	Polwhele, Truro	1	0	0
Pond, S.	Blandford, Dorset	1	0	0
Ponsford, T.	Minehead, Taunton	1	0	0
Poole, A. R.	S. Brent, Somerset	1	0	0
Poole, J. R.	Bridgwater	1	0	0
Pope, Alfred	Dorchester	1	0	0
Pope, Henry	Cotleigh Court, near Honiton, Devon	1	0	0
Pope, John	The Shrubbery, Barnfield, Exeter	1	0	0
+Pope, Rev. W. J. P.	Godmanstone Rectory, Dorchester	.	.	
Porch, J. A.	Edgarley, Glastonbury	1	0	0
*Portal, Melville	Laverstoke House, Micheldever	2	0	0
Portal, Wyndham	Malshanger, Basingstoke	1	0	0
†Porter, R.	The Hollies, Church End, Finchley, London	.	.	
†Portman, C. B.	Bryanston, Blandford	.	.	
†Portman, E. W. D.	Durweston, Blandford	.	.	
*Portman, Viscount	Bryanston, Blandford	5	0	0
*Portsmouth, Earl of	Eggesford, North Devon	5	0	0
Poulett, The Earl	Hinton St. George, Crewkerne	1	0	0

Name.	Residence.	Subscription. £.	s.	d.
Powell, R. H.	Lewes, Sussex	1	0	0
Powell, W. S.	Eglwysnunyd, Taibach	1	0	0
Prall, G. Wilkinson	Molesey House, Rochester	1	0	0
Pratt, Chas.	Wescot, Tallaton, Ottery St. Mary	1	0	0
Pratt, J. D.	Pratts Hayes, Exmouth	1	0	0
Pridham, J. L.	Marine Villas, Paignton, Devon	1	0	0
*Prior, R. C. A.	Halse House, near Taunton	2	0	0
Proctor, H. and T.	Cathay, Bristol	1	1	0
Pulley, J.	Lower Eaton, near Hereford	1	0	0
†Punchard, W. H.	Bourton Hall, Totnes	..		
Purser, Edward, and Co.	116, Fenchurch St., London, E.C.	1	0	0
Quibell Bros.	Newark	1	0	0
Quicke, Rev. C. P.	The Rectory, Ashbrittle, Wellington	1	0	0
Radmore, Henry T	Court Barton, Thorverton, Devon	1	0	0
Raikes, L.	Holcombe, near Bath	1	0	0
*Ramsden, J. C.	Busbridge Hall, Godalming	2	0	0
Randall, R.	Canynge House, Clifton Down	1	0	0
Ransome, James Edward	Orwell Works, Ipswich	1	1	0
Rashleigh, Jonathan	Menabilly, Par Station, Cornwall	1	0	0
Rawlence, James	Bulbridge, Wilton, Salisbury	1	1	0
Raynbird, Hugh E. and Son	The Auction Mart, Basingstoke	1	0	0
Read, B.	New Barn Farm, Keynsham	1	0	0
Read, J. K.	Berwick Farm, Hindon, Salisbury	1	0	0
Reakes, P.	Hill House, Lipyeate	1	0	0
Rees-Mogg, W. W.	Cholwell House, Cholwell, Bristol	1	0	0
Reeves, Robert and John, and Son	Bratton, Westbury, Wilts	1	0	0
Reid, A.	Livingshayes, Silverton	1	0	0
Reid, V. P.	Spring Grove, Milverton	1	0	0
Rendell, Hugh	Selworthy, Minehead	0	10	0
†Rendle, Robert	Catel Farm, Guernsey	..		
Reynolds, A.	Milborne Port, Sherborne	1	0	0
Ribbeck, W. A.	Eastleaze Shaw, Swindon	1	0	0
Rich, C.	Sutton, Berger, Chippenham	1	0	0
Richardson, J. M.	Seymour Court, Great Marlow	1	1	0
*Richmond and Gordon, Duke of.	Goodwood, Chichester	5	0	0
Rickear, Silas	Newlyn East, Grampound Road, Cornwall	1	0	0
Ridler, James	Blackford, Selworthy, Minehead	1	0	0
Ridler, John	W. Lynch, Selworthy, Minehead	0	10	0
Ridler, T. K.	Minehead, Taunton	1	0	0
Rigden, Henry	Lyminge, Hythe, Kent	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Rigg, H. A.	.. ..	1	0	0
*Rivers, Gen. Fox Pitt.	Rushmore Lodge, Ludwick, Salisbury	2	0	0
*Robartes, Lord	Lanhydroc, Bodmin	2	0	0
Roberts, E. A.	Greenhithe, Dartford, Kent	1	0	0
Roberts, J. D. Cramer	Highfield, Frant, Tunbr. Wells	1	1	0
Roberts, J., and Son	Bridgwater	1	1	0
Roberts, T. K.	Fairhill, Exeter	1	0	0
Roberts, Lt.-Col. W. H.	Holborough Park, Rochester	1	0	0
Robins, J.	High Bray, South Molton	0	10	0
Robinson, S.	Lynhales, Kington, Herefordshire	1	0	0
Robinson, John, and Co.	Bristol	1	1	0
Robinson, W. J.	Yatton Keynell, Chippenham	1	1	0
Rock, P.	Gratton, High Bray, S. Molton	1	0	0
†Roe, J. C.	Lynmouth, Lynton	..		
†Rolls, John Allan	The Hendre, Monmouth	..		
Rossiter, James	Westown, R.S.O., near Bristol	1	0	0
Row, W. N.	Cove, Tiverton	1	0	0
Rowe, W.	Stratton, Cornwall	1	0	0
Ruegg, L. H.	Sherborne	0	10	0
Rugg, T. S.	Upton Lovell, Corton, Bath	1	0	0
Ruston and Proctor	Sheaf Iron Works, Lincoln	1	0	0
Ryall, C.	Walcombe Farm, Corton Denham, Sherborne	1	0	0
Sainsbury, Rev. S. L.	Beckington Rectory, Bath	1	0	0
*Saint Germans, Earl of	Port Elliot, Devonport	3	3	0
Salmon, H. C.	North Fields, Bridgwater	1	0	0
Salter, Benjamin	Newlands, Broad Clyst, Exeter	1	0	0
Samuelson, Sir B., M.P.	Banbury	1	0	0
Samuelson and Co.	Banbury	1	0	0
Sanders, E. A.	Stoke House, Exeter	1	0	0
†Sanders, E. J.	Stoke House, Exeter	..		
Sanders, Rev. L.	Rectory, Whimple, Devon	1	0	0
Sanders, T.	Conroy, Broad Clyst, Exeter	1	0	0
Sandvey, H. Poole	Launcelles, Holsworthy	0	10	0
Sanford, E. C. A.	Nynehead, Wellington	1	0	0
Sanford, W. A.	Nynehead, Wellington	1	0	0
Saunders, C. M.	Boracott, Brandiscorner, N. Devon	1	0	0
Saunders, J.	Sutton, Cranborne, Dorset	1	0	0
Saunders, Thomas Chapman	Watercombe Farm, Dorchester	1	0	0
Savidge, M.	Sarsden Lodge Farm, Chipping Norton	1	0	0
Savile, Col. H. B. O.	4, Rodney Place, Clifton	1	1	0
Scanes, H. J.	West Wood, Broad Clyst, Exeter	0	10	0
Scanlen, J. O'Hara	Kerswell, Broadclyst, Exeter	1	0	0
*Scobell, Col. Barton L. J.	Kingwell Hall, High Littleton, near Bristol	2	2	0
Scott, G. S.	Offham, Maidstone	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Scott, T.	Ditton Court, Maidstone	1	0	0
*Scratton, D. R.	Ogwell, Newton Abbott	2	2	0
Searle, J.	Legonna, Newquay, Cornwall.	1	0	0
†Seaton, Lord	Nutwell Court, Lympstone, Devon	..		
Senior, H.	Rushton, Blandford, Dorset	1	0	0
Seward, Samuel N.	Weston, near Petersfield, Hants	1	0	0
Seymour, A. G.	Hinton Farm, Chippenham	1	0	0
†Seymour, R. A. H.	46, Earl Street, Maidstone (Hon. Local Sec., 1884)	..		
Shackell, R.	Manor Farm, Upper Swainswick, Bath	1	0	0
Shakerley, H. W.	The Hall, Fairlight, Hastings.	1	0	0
Shaw, Rev. G. F. E.	Edgworth Rectory, Cirencester	1	0	0
Shaw, Sir J. K., Bart.	Tonbridge	1	0	0
Shelley, Sir John, Bart.	Shobrooke Park, Crediton	1	1	0
Sheppy, J.	Inwoods House, Congresbury, Bristol	1	0	0
†Sherston, Major C. D.	Driscoe House, Bruton, Bath	..		
Sherston, J. D.	Evercreech House, Evercreech	1	0	0
Shore, J. H.	Whatley House, Frome	1	0	0
Sillifant, A. O.	Coombe House, Coppleston, N.D.	1	0	0
Sim, W. C.	Knowle, Clyst-St. George, Topsham	1	1	0
Simmons, Chas. John	Langford, Somerset	1	1	0
†Simmons, Henry	Bearwood Farm, Wokingham	..		
Simpson, F. C.	Derwent Lodge, Dartmouth	1	0	0
*Simpson, Geo.	Wray Park, Reigate	2	0	0
*Singer, A. M.	Redworth, near Totnes	..		
Singer, John J.	Belcombe Farm, Bradford-on-Avon.	0	10	0
*Singer, W. M. G.	Streatfield, Paignton, Devon	5	0	0
Skinner, A.	Bratton, Fleming, Barnstaple	0	10	0
Skinner, A. C.	Pound Farm, Bishop's Lydeard, Taunton	1	0	0
*Skrine, Henry Duncan	Claverton Manor, Bath	2	0	0
Skrine, H. M.	Warleigh Manor, Bath	1	1	0
Slade, A. H.	Castle Hill, Addington, Surrey	1	1	0
Smith, H. J.	Stoke Abbott, Beaminster, Dorset	1	0	0
Smith, Hugh C.	Mount Clare, Roehampton	1	0	0
Smith, J.	Stretford, Manchester	1	0	0
†Smith, S. Lee	Larkfield, Maidstone	..		
Smith, W.	Sundon House, Clifton Down, near Bristol	1	0	0
*Smith, Right Hon. W. H., M.P.	Greenlands, Henley-on-Thames	5	0	0
Smith, W. Hellier	West Newton, Bridgwater	1	0	0
*†Smyth, Sir J. H. Greville, Bart.	Ashton Court, Bristol	..		
Snayden, W.	Corscombe, Dorchester	1	0	0
Snow, Edmund	The Quarries, Exeter	1	0	0
Somer, J.	Broadclyst, Exeter	1	0	0
†Somerville, A. F.	Dinder House, Wells	..		

Name.	Residence.	Subscriptions. £.	s.	d.
†Spackman, Henry	Bath	.	.	.
*Sparrow, B.	Cleeve House, Ivybridge	2	0	0
Spear Bros.	Southgate Street, Bath	1	0	0
†Spearman, Sir J., Bart.	Llansannor Court, Cowbridge	.	.	.
Speed, W. S.	Mill Farm, Priston, Bath	1	0	0
Speke, W., jun.	Jordans, Ilminster	1	1	0
Spencer, J. M.	Oakhill, Bath	1	0	0
Spencer, S.	Holywell Manor, St. Ives	1	0	0
Spicer, Capt. J. W. Gooch	Spy Park, Chippenham	1	0	0
Spicer, C.	Manor Farm, Bishops Caundle, Sherborne	1	0	0
Spire, Joseph	High Street, Glastonbury	1	0	0
Spratts' Patent	Henry Street, Bermondsey, London	1	0	0
Spurway, Rev. Edward	Heathfield, Taunton	1	0	0
Squarey, E. P.	Salisbury	1	1	0
†Stacey, F. E.	Llandough Castle, Cowbridge	.	.	.
Stallard, W.	Chewton Mendip, Bath	1	0	0
Stanford, A.	Eatons, Steyning, Sussex	1	1	0
†Stanford, W.	Steyning, Sussex	.	.	.
Stanford, W. H. E.	Frylands, Henfield, Sussex	0	10	0
Stanhope, Rev. B. L. S.	Byford Rectory, Hereford	1	0	0
*Stanley, E. J., M.P.	Quantock Lodge, Bridgwater	2	0	0
Steeds, A.	Red House Farm, Stratton-on-the-Fosse, Bath	1	0	0
Steer, J.	Yondercott, Uffculme, Devon	1	0	0
†Stephens, Darell	Trewornan, Wadebridge, Cornwall	.	.	.
Stevens, W.	Budlake, Broad Clyst, Exeter	1	0	0
Still, Henry	Addington House, Addington, Croydon	1	0	0
Stocker, G.	High Street, Exeter	1	0	0
Stokes, Robert	Burroughs Hill, Salisbury	1	0	0
Stone, John S.	Clarence Place Works, Newport, Monmouth	0	10	0
*Story-Maskelyne, N., M.P.	Basset Down House, Swindon	2	0	0
†Strachey, E.	Pensford, Somerset	.	.	.
Stratton, Richard	The Duffryn, Newport, Monmouth	1	0	0
*Strickland, A. L.	23, Warwick Square, London, S.W.	2	0	0
Stuckey, Vincent	Hill House, Langport	1	0	0
Stuckey, W. J.	Lambridge Lodge, Bath	1	0	0
*Stucley, Sir G. S., Bart.	Moreton, Bideford	2	0	0
Studdy, T. E.	Leckford Down, Stockbridge	1	0	0
Stunt, Warwick	Abbott Court, Hoo, Rochester	1	0	0
Sturge, William	Bristol	1	1	0
Style, A. F.	Boxley House, Maidstone	1	0	0
Surtees, W. E.	Tainfield, Taunton	1	0	0
Sutton, John C.	Shirley, near Southampton	1	0	0
*Sutton, M. J.	Kidmore Grange, Caversham, Oxon	2	0	0
*Sutton and Sons	(Seedsmen) Reading	2	2	0
Swanwick, R.	College Farm, Cirencester	1	0	0
Swayne, W. T	Glastonbury	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Talbot, Major-Gen. Fitzroy Somerset	Army and Navy Club, London	1	0	0
Tangyes (Limited)	Cornwall Works, Birmingham	1	0	0
Tanner, E. F.	Hawson Court, Buckfastleigh	1	0	0
Tanner, J. B.	King's Weston, Shirehampton, Bristol	1	0	0
Tapp, David James	Knaplock, Winsford, Dulverton	1	0	0
Tapp, John	Winsford, Dulverton	0	10	0
Tapscott, H.	13, James Road, Exeter	1	0	0
Tasker, W., and Sons	Andover	1	1	0
Tate, J. A.	Fairfield, Wells	1	0	0
Tayleur, C. W.	Hampton, St. Mary Church, Torquay	1	0	0
Taylor, E. B.	27, Great George Street, London.	1	0	0
†Taylor, George	Stanton Prior, near Bristol		..	
Taylor, H. W.	Showle Court, Ledbury, Hereford	1	0	0
†Tazewell, W. H.	Manor House, Taunton St. Mary's		..	
*Temple, Earl	Newton Park, Newton St. Loe	2	2	0
Templer, Rev. J. L.	The Rectory, Burton Bradstock, Bridport	1	0	0
Thomas, T. C.	The Manor, Weston Bampfylde, Sparkford, Bath	1	0	0
Thompson, John	Badminton, Chippenham	1	1	0
Thomson, Col. White	Broomford Manor, Exbourne, N. Devon	1	0	0
†Thorley, Joseph	Thornhill Bridge, Caledonian Road, King's Cross, London, N.		..	
Thorne, C. G.	Curdon Farm, Williton, Somerset	1	0	0
Thorne, J.	West Yard, N. Molton	0	10	0
Thorne, J. G.	Horridge, Romansleigh, S. Molton	0	10	0
Thorne, John	Bradley, Winsford, Dulverton	0	10	0
Thresher, John	Corfe Hill, Weymouth	1	0	0
Thring, Theodore	Alford House, Castle Cary	1	1	0
Throckmorton, Sir N. W., Bart.	Buckland, Faringdon, Berks	1	0	0
*Thynne, Lord H.	.. ..	2	0	0
Tilley, W. T. S.	Quaish Farm, N. Wootton, Shepton Mallett	1	0	0
Titt, J. W.	Implement Maker, Warminster	1	0	0
*Tolcher, E. H. A.	Harewood, Plympton St. Mary	2	0	0
Treadwell, John	Upper Winchendon, Aylesbury	1	0	0
*Tredegar, Lord	Tredegar Park, Newport, Monmouth	2	2	0
Tremaine, James	Tregonning, Grampound Road, Cornwall	1	0	0
Tremaine, W. H.	Trerice, Newlyn, Grampound Road, Cornwall	1	0	0
Tremaine, W. H.	Sherborne, Northleach, Cheltenham	1	0	0
*†Tremayne, John	Heligan, St. Austell		..	

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Name.	Residence.	Subscriptions. £.	s.	d.
Treneer, W. T.	Degembris North, Newlyn East, Cornwall	0	10	0
Trevilian, E. B. Cely	Port Town, Taunton	1	0	0
†Trood, Col. Robert	Matford, near Exeter	.	.	
Trotman, E. R.	The Elms, Frome	1	1	0
*Troyte, Col.	Huntsham, Bampton, Devon	2	2	0
Tucker, H. B.	Bath and Somerset Dairy Company, Bath	1	0	0
Tucker, R.	Bratton Fleming, Barnstaple	0	10	0
Tucker, W. D.	74, High Street, Southampton	1	0	0
Tudge, W.	Leinthall, Ludlow	1	0	0
†Tudway, C. C.	Cedars, Wells, Somerset	.	.	
†Turbervill, T. B.	Ewenny Priory, Bridgend	.	.	
Turner Brothers	Milsom Street, Bath	1	0	0
Turner, J.	Backwell, Bristol	1	0	0
Unite, John	291, Edgware Road, London	1	0	0
Unwin, L.	Tiverton	1	0	0
Van Hasselt, W. A.	Rotterdam, Holland	1	0	0
Vaughan, J.	Albrightlee, Battlefield, Shrewsbury	1	0	0
Vellacott, H. W. Hopper	Stone Farm, Exford, Taunton	1	0	0
Venables, Rev. R. L.	Newbridge-on-Wye, near Builth	1	1	0
Veysey, F.	Bratton, Chittlehampton, Devon	1	0	0
Vickress, T. A.	Hill, Slinfold, Horsham	1	0	0
Vipan and Headley	Leicester	1	0	0
Vosper, W. P.	Saltram Farm, Plympton, Devon	1	0	0
Wainwright, Charles R.	Shepton Mallet	1	1	0
Wallis, F.	Lincoln	1	0	0
Wait, W. S.	Woodborough House, Bath	1	1	0
Walden, J.	Chilcombe, Bridport	1	0	0
Wallington, A. W.	Basingstoke	1	0	0
Wallis and Steevens	North Hants Iron Works, Basingstoke	1	0	0
Walrond, Sir W. Hood, Bart., M.P.	New Court, Topsham, Devon	1	0	0
†Walsingham, Lord	Merton Hall, Thetford, Norfolk	.	.	
†Walter, John	Bearwood, Wokingham	.	.	

Name.	Residence.	Subscriptions. £.	s.	d.
Wansay, A. H.	2, St. Stephen's Chambers, Baldwin Street, Bristol	1	1	0
Wantage, Lord, K.C.B., V.C.	Lockinge Park, Wantage . . .	1	0	0
Warde, A.	West Farleigh, Maidstone . . .	1	0	0
Waring, H. F.	46, Earl Street, Maidstone . .	1	0	0
Warne, C. G.	Weston-super-Mare	1	0	0
†Warner, T. C.	Woodford, Essex		. .	
†Warre, Frederick	44, Great Ormond Street, Bloomsbury, London		. .	
Warre, Rev. E., D.D. . . .	Eton College, Windsor . . .	1	0	0
*Waterlow, W. B.	High Trees, Redhill, Surrey. .	2	0	0
Waterlow Cake Mills . . .	Wilmington, Hull	1	1	0
Watson, James	Melksham, Wilts	1	0	0
Watts, John	Gatcombe Farm, Bristol . . .	1	0	0
Webb, E., and Sons . . .	Wordesly, Stourbridge	1	0	0
Webb, J.	High Street, Kensington, London	1	0	0
Webber, John	West Bagborough, Taunton . .	0	10	0
Wedmore, F. H..	Red House Farm, Stoke Bishop, Bristol	1	0	0
Were, J. Kennet	Sidmouth	1	1	0
†*Weymouth, Viscount, M.P.	Longleat, Warminster		. .	
White, Arthur J.	Wrangaton Manor House, Ivybridge	1	0	0
White, J.	Manor Farm, Zeals, Wilts . .	1	1	0
White, W. S.	Charnage, Mere, Bath	1	0	0
White, George	Hunton, Maidstone	1	0	0
White, H.	Cheese Factor, Frome	1	0	0
White, H.	Stanley, Chippenham	1	0	0
White, J. Bazley, M.P. . .	21, Ennismore Gardens, London, S.W.	1	0	0
*†Whitehead, C., F.L.S. . .	Barming House, Maidstone . .		. .	
*Whitehead, R.	Old Paddockhurst, Worth, Crawley	2	2	0
Whitting, C. E.	Sandcroft, Uphill, Weston-super-Mare	1	1	0
Wickham, C. E.	Palace Farm, Wells	1	0	0
Wickham, H.	Nettlestead Court, Maidstone .	1	0	0
Wickham, W.	Binsted-Wyck, Alton	1	0	0
Wigan, J. L.	Oakwood, Maidstone . . , .	1	0	0
Wigan, W. L.	Larkfield House, Maidstone . .	1	0	0
Wilcox, W. H., and Co. . .	36, Southwark Street, London .	1	1	0
Wilkinson Brothers	Union Street, Bath	1	1	0
Wilkinson, Capt. G. W. . .	Risca, Mon.	1	0	0
Wilkinson, W.	Bacton Manor, Pontrilas . . .	1	0	0
Willett, J. S.	Petticombe, Torrington . . .	1	0	0
†Willett, P. A.	Ashcroft, Kingston-by-Sea, Sussex		. .	
William, J. P.	Noyadd, Rhayader	1	0	0
Williams, A. G.	St. George's Brewery, Portsea, Hants	1	0	0
Williams, Edward Wilmot .	Herringston, Dorchester . . .	1	0	0
Williams, George	Wick Farm, Winsford, Dulverton	0	10	0
Williams, J. C.	Carhyss Castle, Werrington Park, Launceston	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Williams, Capt. J.	The Fields, Newport, Mon.	1	0	0
Williams, I.	Ormond House, Weston, Bath	1	0	0
Williams, J.	Regilbury Park, Winford, Somerset	1	0	0
†Williams, J. A.	Brideshead, Dorchester		.	.
Williams, M. H.	Pencalerick, Truro	1	0	0
†Williams, M. Scott	Woolland House, Blandford		.	.
Williams, Rev. S. H.	Great Linford Rectory, Newport Pagnell	1	0	0
†Williams, Robert	Brideshead, Dorchester		.	.
†Williams, R., jun.	Brideshead, Dorchester		.	.
Williams, R. and Son	Churn Works, Hay, Builth	1	0	0
*Williams, Sir W. R., Bart.	Heanton Court, near Barnstaple	2	2	0
Willis, John Gale	Newton St. Loe, Bath	1	0	0
Willis, Joseph D.	Bapton, Codford, Wilts	1	1	0
†Wills, J.	Berry Barton, Totnes, Devon		.	.
Wills, William Henry	Blaydon, R.S.O., Somerset	1	0	0
Wills, Messrs.	East Wray, Lustleigh, Newton Abbott	1	0	0
Willyams, Ed. W. Bridges	Nanskeval, St. Columb, Cornwall	1	0	0
†Wilson, J. Wilson	Farmers' Club, Salisbury Hotel, Salisbury Sq., Fleet St., London		.	.
*Winchester, Marquis of	Amport St. Mary's, Andover	2	0	0
*Windsor, Lord	Hewell Grange, Worcester	2	0	0
Ditto	Ditto. (additional)	2	0	0
Wingfield, W. H.	Sutton Park, Sandy, Beds	1	0	0
Winter, G.	Chedzoy, Bridgwater	0	10	0
Winter, Major J. A.	Watts House, Bishop's Lydeard, Somerset	1	0	0
†Wintle, R. W.	Old Square, Lincoln's Inn, London		.	.
Winwood, T. H. R.	Wellisford Manor, Wellington, Somerset	1	0	0
Wippell Bros. & Row	High Street, Exeter	1	0	0
Wippell, Richard	Rudway, Thorverton	1	0	0
Wish, Thomas	Broadclyst, Exeter	0	10	0
Wodehouse, E. R., M.P.	56, Chester Square, London	1	0	0
†Wollocombe, J. B.	Dunterton, Tavistock		.	.
Wood-Homer, G.	Athelhampton, Dorchester	1	0	0
Wood, Martyn H. G.	*Gazette* Office, Bath	1	0	0
Wood, J. Gaythorne	Thedden Grange, Alton, Hants	1	1	0
Wood, W. A.	36, Worship Street, London, E.C.	1	0	0
Woodard, Rev. Canon	Henfield, Sussex	1	0	0
Woods, Thomas, Col.	Llandaff Place, Llandaff	1	0	0
Woolcombe, C. B.	Ashbury, Exbourne, N. Devon	1	0	0
Worth, W.	Broad Clyst, Exeter	0	10	0
Wrennall, W.	9, Harrington Street, Liverpool	1	0	0
Wyatt, G. N.	Slough Place, Cuckfield, Sussex	1	0	0
Wyatt, J.	Claverham, Yatton	1	0	0
Wyatt-Edgell, A., Col.	Cowley House, Exeter	1	1	0
Wyles, J.	Stonehouse Farm, Frindsbury, Rochester	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Yalland, J.	Manor House, Fishponds, Bristol	1	0	0
Yatman, Rev. J. A.	Winscombe Hill, Weston-Super-Mare	1	0	0
Young, J.	Pinfold, Sherborne, Dorset . .	1	0	0
(3) Total . . 1269				

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"REGIS" TRADE MARK"

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